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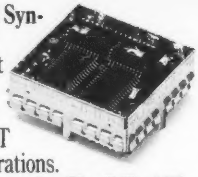

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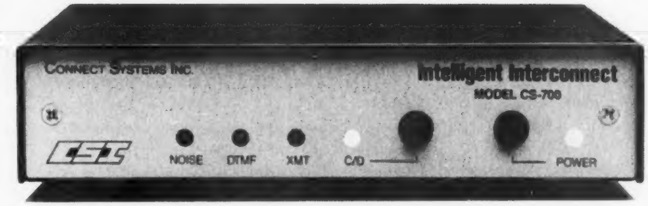

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SPECIAL EVENTS

Ham Doings Around the World

Listings are free of charge as space permits. Please send us your Special Event two months in advance of the issue you want it to appear in. For example, if you want it to appear in the June issue, we should receive it by March 31. Provide a clear, concise summary of the essential details about your Special Event.

FEB 3

ST. CATHARINES ONT The Niagara Peninsula ARC is holding its 12th Hamfest and Dinner Dance at the C.A.W. Hall. Admission $3, tables $12 commercial and $5 noncommercial. Talk-in 147.24/.84. Write *N.P.A.R.C. Inc., PO Box 692, St. Catharines, Ont. L2R 6Y3, or call (416) 682–4844.* Dinner-dance tickets available only in advance.

FEB 11

MELVILLE NY The Long Island Mobile ARC will sponsor a Hamfest at Electricians Hall from 9 AM–4 PM. No advance tickets, $5 at door. Exhibitors $20 (advance). For more info contact *Neil Hartman WE2V, (516) 462–5549 or Mark Nadel NK2T, (516) 796–2366.*

MANSFIELD OH The Mansfield Mid-Winter Hamfest/Computer Show will be held at the Richland County Fairgrounds. Doors open at 7 AM. Advance tickets $4, $5 at the door. Advance tables $7, $10 at the door. Talk-in, call W8WE on 146.34/.94. Advance ticket/table orders must be received and paid by Feb. 1. For information send SASE to *Dean Wrasse KB8MG, 1094 Beal Road, Mansfield OH 44905* or phone (419)589–2415 after 4 PM EST.

FEB 17

MARLBORO MA The Algonquin ARC is holding its Electronics Flea Market at the Marlboro Middle School Cafeteria from 10 AM–3 PM. Sellers 8 AM. Talk-in: 146.01/.61. Admission $2. Advance tables $10, $12 at the door. Wheelchair accessible. Contact *Ann KA1PON at (508) 481–4988* or write *A.A.R.C., Box 258, Marlboro MA 01752.*

SALEM OR The Salem and Oregon Coast Emergency Repeater Associations will sponsor the 1990 Ham Fair at the Polk County Fairgrounds beginning at 9 AM. Talk-in: 146.26/.86. Write *Salem Repeater Assoc., PO Box 784, Salem OR 97308.*

FEB 17–18

SARASOTA FL The Sarasota Hamfest South Florida Section ARRL Convention Computer Show is being held at the Robarts Arena by the Sarasota ARA from 9 AM–4 PM. (Set-up on Feb 16th. Free parking. RV space. Talk-in: 146.31/.91, 147.90/.30, 449.425/.95. Admission $5 in advance, $7 at the door. Contact *Hadley Carrigan N4ODK, 101 N. Adams Dr., Sarasota FL 34236, (813) 388–2868.*

FEB 24

MILTON VT The Northern Vermont Mid-winter Hamfest Committee is holding its Flea Market/Auction at the Milton High School from 9 AM–3 PM. Admission $2. Free tables. Talk-in: 145.47/-600. Please call *Mitch Stern WB2JSJ at (802) 879–6589, or Tom Taylor N1EXY at (802) 893–4834.*

BROOKSVILLE FL The Hernando County ARA will hold its eighth annual Hamfest at the Hernando County Fairgrounds auditorium. Advance tickets are $3, $4 at the door. For tickets and swap table reservations, send your check and an SASE to *Hernando County ARA, PO Box 34605-1721, Brooksville, FL 34605. For more information call (904) 796-4840 after 6 PM.*

LAPORTE PA The Laporte ARC's Winter Hamfest is *Saturday* at the Laporte Civic Auditorium. Laporte is 50 miles Southeast of Chicago. Talk-in on 146.52 simplex. Forums include the Midwest Microwave Society's construction exhibit and seminar (bring your SHF projects). Donation is $3.50. Advance tables are $3.50, reserve by sending check and SASE to *LPARC, PO Box 30, Laporte IN 46350.*

FEB 25

DEARBORN MI The Livonia ARC will hold its 20th annual LARC Swap 'n Shop from 8 AM–4 PM at Dearborn Civic Center. Free parking. Talk-in: 144.75/5.35 and 52. Reserved 8-foot minimum table space available. For further information send SASE (4x9) to *Neil Coffin WA8GWL, c/o the Livonia ARA, PO Box 2111, Livonia MI 48151.*

CUYAHOGA FALLS OH The Cuyahoga Falls ARC will hold their 36th annual Hamfest at the Akron North High School from 8 AM–3 PM. Handicap accessible. Tickets $3 in advance, $4 at the door. Advance tables $5, $6 at the door. Sellers may bring their own tables. SASE for ticket orders and table reservations. Talk-in: 87/27. Get details from *Bill Sovinsky K8JSL, 2305 24th St., Cuyahoga Falls OH 44223. (216) 923-3830.*

DAVENPORT IA The Davenport ARC will host its 19th annual Hamfest at the Davenport Masonic Temple starting at 8 AM. Talk-in on the V0BXR 146.28/.88 repeater. Advance tickets are $2, $3 at the door. Tables are $7. For info or reservations contact *Dave Johannsen WB0FBP, 2131 Myrtle St., Davenport IA 52804. For ARRL/VEC exam information, contact Al Broendel N9OK, 2712 38th St., Rock Island, IL 61201.*

SPECIAL EVENTS STATIONS

FEB 1-FEB 11

QUEBEC CANADA The Carnaval de Quebec Special Event and Contest is sponsored by the Club Radio Amateur de Quebec Inc., with the Carnaval de Quebec Inc., from 0000Z Feb. 1st to 2100Z Feb. 11th. Open to all amateurs worldwide 80–10 meters (excluding WARC bands). CW contest is on Feb 3 at 0000 Z. Phone contest is Feb. 10. Souvenir plaques will be sent to the first five hams to contact the station three times, each time on a different band in the same mode. Special call is CY2CQ. To receive special QSL card please send your card and an SASE or with 2 IRCs to: *C.R.A.Q. VE2CQ, CP 2341 Quebec, Que, Canada G1K 7P5* before April 15 1990 midnight.

FEB 2–4

DRY TORTUGAS (IOTA NA-79) WA4DAN and K5MK will operate /4, from 2000Z Feb. 2–1600Z Feb. 4, in the first expedition to this island in over 20 years. Frequencies: Phone—14260 (including the IOTA net, 1300Z Sat. & Sun.), 21260 and 28560; CW—7030, 14030, 21030 and 28030. QSL with SASE/IRCs/return postage to operator's callbook address.

FEB 3–4

MONTPELIER VT The Central Vermont ARC (W1BD) is sponsoring a Vermont QSO Party from 0001Z Feb. 3—2400Z Feb. 4. Frequencies: Phone: 80–15 meters: The first 25 kHz up from General Phone band edge; Novice 10 meter phone portion, 50.110, 144.2. CW: 3540, 3720, 7040, 7120, 14040, 21040, 21140, 28040. RTTY: 3620 and 90 kHz from lower edge of other bands. Send SASE now for official score and log sheets. Send logs/facsimiles, name, address no later than 1 March to *D. Loverin WA1PDN, 50 Liberty Street, Montpelier VT 05602*

FEB 9–18

SAN BENITO TX The San Benito ARC will operate N5COW on SSB, and N5HOG on RTTY to commemorate the 10th anniversary of the Cameron County Fair and Livestock Show. Frequencies: 28.360, 21.350 and 14.335 SSB, and 14.090 RTTY. From 1800 UTC–0100 UTC. For Certificate, send business SASE (folded) 9½ x 11 (unfolded) and QSL card to *San Benito ARC, Brenda V. Ryan—QSL Mgr., PO Box 1382, San Benito TX 78586-1382.*

FEB 12–16

NEW YORK NY School Club roundup (Formerly Operation SEARCH) is sponsored by the Council for the Advancement of Amateur Radio in the New York City Schools, the ARRL and its Hudson Division Education Task Force to foster contacts with and among school radio clubs. Contest period is Monday thru Friday 0800–2000 EST. Operate no more than 24 of the 60 hours. Logs must clearly show on and off times. Off periods must be at least 30 minutes. Send a large SASE or sufficient IRCs for more info and results to *Lew Malchick N2RQ, Brooklyn Technical High School, 29 Fort Greene Place, Brooklyn NY 11217.*

FEB 24–26

PORTLAND ME The Southern Maine Contest Club is sponsoring a Maine QSO Party from 1900Z Feb. 24–0300Z Feb. 26. Exchange: RS(T) and QTH (county for ME stations; state, Province or country for others). Categories: All band QRO 10 meter only 200W limit. Scoring: 1 point for phone QSOs, 2 points for CW QSOs, multiply by number of counties (16 max) or states, Provinces and countries for Maine stations. Frequencies for CW: 50 kHz up. Phone: 3960, 7230, 14280, 21380, 28480, 50130. Awards: Certificates for each category in each ME. county, state and country. Logs and summary sheet should be sent within 30 days of the contest to *SMCC, PO Box 3422, Portland ME 04104.*

73 AMATEUR RADIO®

FEBRUARY 1990
Issue #353

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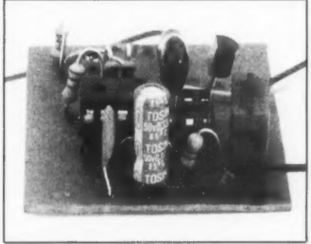

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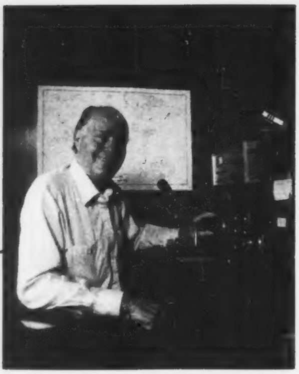
Wayne Green W2NSD/1



Beating The Code

It's a shame that the Morse Code is such a bugaboo that its mere specter has been scaring off potential ham newcomers by the tens of thousands. This whole thing is just plain bunk. Learning the code is a snap—if you do it the right way.

Yes, the time-dishonored ARRL system, which most of you probably used, makes the code so difficult to learn that you never forget the weeks or even months of agony it caused. This idiotic and unnecessary anguish has become, in some ossified minds, a right of passage into hamdom. Make 'em suffer, dammit—I had to.

Indeed, our licensing system, which was designed and pushed through the FCC by the League an eon ago, poured the concrete for the system. Five wpm for Novice and Tech, 13 per for General and Advanced and 20 big ones for Extra. From this progression it's obvious that we're supposed to memorize the code, then build our speed up to 5 wpm and then increase it to 13. Then we go on, slowly and painfully increasing, until we finally (whew!) are able to copy 20.

Yes, it actually is possible to do all that. And yes, the process does seem to drive about 90% of our potential hams away. Heck, almost half (43%) of our current licensees seem to have given up even trying to get beyond 5 wpm—making them essentially second class ham citizens. But since when did we Americans ever let the utter failure of our laws discourage us?

The pathetic fact is that learning the code is so easy it's ridiculous. It's been a while since I've written an editorial about this, so you've probably forgotten.

Let's take this whole thing in two steps, since the brain works entirely differently for them. First there's the 5 wpm hurdle. I memorized the code in a few minutes one night while I was getting into my Boy Scout uniform. I'd put it off until the last minute, but I had to know it for the meeting that night. I'll bet I spent 20 minutes—and I've known it ever since.

Of course, it isn't actually necessary to learn the code to pass the Novice or Tech code test. We published a great article in *73* (July 1988) on how to pass the code test without even knowing all the letters, much less being able to copy at 5 wpm. It had to do with merely writing down the dots and dashes, which is easy at that stupid speed. Then you work out the actual letters and numbers from the dots and dashes at your own pace. There's no time limit on the test, you know.

I've heard about a hamfest where they failed everyone who used this system. They're very fortunate that they didn't do that to a litigious person, else they could have been slapped with one heck of an expensive lawsuit. That's when you want to make sure that your club is properly incorporated and has plenty of liability insurance. It's unfair, but no matter who in your club is dumb enough to pull a stunt like that, a litigant will love it and his lawyer will sue the club members with the deepest pockets.

Skip 13, Go For 20

Now, what about the 13 you need for the General Class license? Forget it and go for the 20 right off the bat. I know that sounds crazy, particularly if you've talked with a ham who's spent a year sweating blood to get up to 20 wpm. Once you have a better understanding of how the brain works, it all makes sense.

You see, what happens when you go for your 5 wpm test is that you memorize the code for the alphabet, numbers and punctuation. In computer parlance you set up a lookup table in your mind. Anyone not suffering from Alzheimer's can memorize the forty characters in a few minutes. Then, when you hear a dah-di-die-dit, you think over the list you've memorized and find the letter B. This works just fine until you get up to the clock speed of the brain. Then you find that no matter how hard you try, you can't copy any faster. This is the infamous plateau which hits at around 10 wpm. No matter how hard and long you grind, you can't speed up the brain.

So how can some people copy 80 wpm? Well, they don't do it using a lookup table, that's for sure. No, if you want to copy code faster than 10 wpm you have to start from scratch and train your brain to recognize the sound pattern of each code character at the speed you want to copy and then train your hand to write that character or type it. It's just like learning to type or play an instrument.

If you think about it, you'll see that there is not even a remote parallel between recognizing the pattern for a letter and writing it, and hearing the sound, translating the sound into dots and dashes with one side of your brain, passing that info to the other, where the lookup table is stored, then passing back the info on what letter to write.

There's even more trouble ahead. You're not out of the woods yet. When you train your mind to automatically have you write a letter when you hear a sound pattern, I hope it makes sense that if you vary that sound pattern very much, the mind won't be able to recognize it.

So what we do is use our lookup table system to get through the 5 wpm test. Then we build up our speed until we eventually have to start over and learn it the right way, by sound. That eventually gets us through the 13 per test. Now we move to 14, 15 and gradually up. It's tough going, because we have to relearn the sound patterns for every speed as we increase. This is why it can take months and create a severe trauma.

Smart code teachers start their students out at 20 wpm right from the beginning. Since it's no more difficult to learn code at 20 or even 35 wpm than it is at 13 wpm, why even bother with the slower speed?

How do you do this? You start out with a 20 wpm tape (you'll find one designed for this system in Uncle Wayne's Bookshelf—73T20) and simply listen for a dit. Write down an E. Pretty soon you'll hear every E as it goes by. Now listen for dit-dits and write an I. You'll notice that you'll still be writing the Es too.

Work your way through the alphabet. It's better to start with the more frequently used letters—ETAION SHRDLU. I'll bet you'll be able to tackle the 20 wpm test within a few days this way. Some people don't need more than four or five hours, starting from scratch.

But what about copying code over the air? Don't worry about it—almost everyone today is using a computer to send and receive code. Yes, these are the same codgers who are so adamant about all newcomers passing a code test. I never suggested there were any rational reasons for knowing the code. It's a religious matter.

Once you've taught your brain to copy code at 20 wpm it isn't going to be easy to copy the average key jockey. Your aim was to get your license as easily as possible. Of course, now that you know the code, you may want to start using it and getting your brain so it can decipher it at different speeds.

Frankly, I'd like to see the code test done away with. It's been irrelevant for more than a generation. Yes, I've heard the old saw about the code helping to keep out undesirables. Even a short listen to our bands should expose that concept as ridiculous. We already have the undesirables with us—in large numbers.

If you've read about the wonderful job hams did during the recent hurricane and earthquake, you also know that whole gangs of hams, many of them Extra Class, got together to do everything they could to jam and disrupt the emergency traffic nets.

I happen to think that the code is great for those who enjoy using it. It's easy to learn and fun to use, but it's terribly destructive to the growth of amateur radio.

Japan and No-Code

Opening some unwanted UHF bands for no-coders won't work any better for us than it's done for Canada or Britain, where the concept turned out to be a total flop. The Japanese system, where no-coders are permitted to operate on all ham bands, has helped them achieve far more growth than we have experienced.

Indeed, I'm convinced that the incredible number of new hams the Japanese no-code system has brought into the hobby is the reason why there are so many Japanese engineers and technicians. It's one of the main reasons why Japan has been able to completely clobber America in consumer electronics. And we know that their electronics industry is the very heart of the recent Japanese financial strength—and why they've been able to buy so much of America, like CBS and Rockefeller Center.

No, engineers and technicians aren't everything. We still need to develop some American industrial goals and pursue them. We need to make investment capital easier for entrepreneurs to get through tax law changes. But without engineers, no amount of other finagling is going to do us much good.

Can we convince any youngsters we manage to interest in amateur radio that all they have to do is spend 20 minutes a day for a few days and they'll master the code well enough to pass the 20 wpm test? Not when we have four hundred thousand hams who are totally convinced that the code is a monumental obstacle—painful on the order of childbirth.

Look, I managed to get through using the old progressive speed ARRL system, so I know the misery it causes. I just have never had the sadistic desire

Continued on page 78

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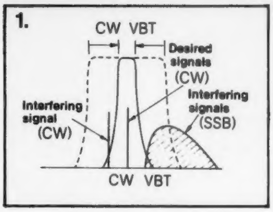
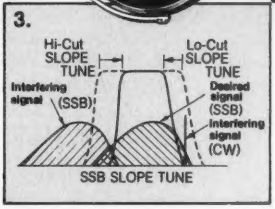
- **100% duty cycle transmitter.** Kenwood specifies transmit duty cycle ***time.*** The TS-940S is guaranteed to operate at full power output for periods ***exceeding one hour.*** (14.250 MHz, CW, 110 watts.) Perfect for RTTY, SSTV, and other long-duration modes.
- **First with a full one-year limited warranty.**
- **Extremely stable phase locked loop (PLL) VFO.** Reference frequency accuracy is measured in ***parts per million!***

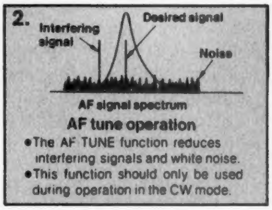
1.


CW VBT
Desired signals (CW)
Interfering signals (SSB)
Interfering signal (CW)
CW VBT

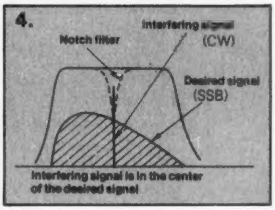
3.


Hi-Cut SLOPE TUNE
Lo-Cut SLOPE TUNE
Interfering signal (SSB)
Desired signal (SSB)
Interfering signal (CW)
SSB SLOPE TUNE

2.


Interfering signal
Desired signal
Noise
AF signal spectrum
AF tune operation
•The AF TUNE function reduces interfering signals and white noise.
•This function should only be used during operation in the CW mode.

4.


Notch filter
Interfering signal (CW)
Desired signal (SSB)
Interfering signal is in the center of the desired signal

1) CW Variable Bandwidth Tuning. Vary the passband width continuously in the CW, FSK, and AM modes, without affecting the center frequency. This effectively minimizes QRM from nearby SSB and CW signals.

2) AF Tune. Enabled with the push of a button, this CW interference fighter inserts a tunable, three pole active filter between the SSB/CW demodulator and the audio amplifier. During CW QSOs, this control can be used to reduce interfering signals and noise, and peaks audio frequency response for optimum CW performance.

3) SSB Slope Tuning. Operating in the LSB and USB modes, this front panel control allows independent, continuously variable adjustment of the high or low frequency slopes of the IF passband. The LCD sub display illustrates the filtering position.

4) IF Notch Filter. The tunable notch filter sharply attenuates interfering signals by as much as 40 dB. As shown here, the interfering signal is reduced, while the desired signal remains unaffected. The notch filter works in all modes except FM.

- **Complete all band, all mode transceiver with general coverage receiver.** Receiver covers 150 kHz-30 MHz. All modes built-in: AM, FM, CW, FSK, LSB, USB.
- **Superb, human engineered front panel layout for the DX-minded or contesting ham.** Large fluorescent tube main display with dimmer; direct keyboard input of frequency; flywheel type main tuning knob with optical encoder mechanism all combine to make the TS-940S a joy to operate.
- **One-touch frequency check (T-F SET) during split operations.**
- **Unique LCD sub display indicates VFO, graphic indication of VBT and SSB Slope tuning, and time.**
- **Simple one step mode changing with CW announcement.**
- **Other vital operating functions.** Selectable semi or full break-in CW (QSK), RIT/XIT, all mode squelch, RF attenuator, filter select switch, selectable AGC, CW variable pitch control, speech processor, and RF power output control, programmable band scan or 40 channel memory scan.

Optional accessories:
• AT-940 full range (160-10m) automatic antenna tuner • SP-940 external speaker with audio filtering • YG-455C-1 (500 Hz), YG-455CN-1 (250 Hz), YK-88C-1 (500 Hz) CW filters; YK-88A-1 (6 kHz) AM filter • VS-1 voice synthesizer • SO-1 temperature compensated crystal oscillator • MC-43S UP/DOWN hand mic. • MC-60A, MC-80, MC-85 deluxe base station mics. • PC-1A phone patch • TL-922A linear amplifier • SM-220 station monitor • BS-8 pan display • IF-232C/IF-10B computer interface.

Complete service manuals are available for all Kenwood transceivers and most accessories.
Specifications, features, and prices are subject to change without notice or obligation.

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QRX . . .

Number 3 on your Feedback card

EDITED BY JIM BAIL KA1TGA

Hams Help in Romanian Crisis

Morel 4X1AD sends thanks from Romania. He is a Romanian-born Israeli ham (ex-YO4BRR & YO4BE). He has informed us of the following communications efforts by hams worldwide between December 22 and December 28, 1989:

- In the first 30 hours the single two-way reliable communications system was the 3650 kHz and 14130 kHz nets.
- In the first two days, during the almost total collapse of national and local communications systems, hams handled messages for the Romanian army and for local self-defense groups. (More details to come on this.)
- After December 24 hundreds of hams from Israel delivered thousands of messages from families all over the world to their relatives in Romania (4X1AD himself handled over 600 messages). Unfortunately, propagation to the US was poor during this period so only a few messages were handled to and from the US.
- Many messages were handled for the Red Cross in over 20 countries, including coordination between the convoys of thousands of first-aid vehicles from the rest of Europe and the Romanian army. Hams helped to pre-identify these vehicles and set up army escort for them from the borders.

Many thanks to all the Europeans and DX operators for their important and effective help and for their solidarity with the Romanian people! Many thanks to everyone for not QRMing the net frequencies, and for retranslating when propagation was down. Plus many thanks to YO hams from the near 400,000 Israeli citizens of Romanian origin for their tremendous effort in handling the many thousands of messages from and to their relatives in Romania.

The most important thing is that now all of the YO hams can talk FREELY!

No Amateur License Fees

Amateur license fees have been deleted from the budget reconciliation legislation now under consideration in Congress. The conference committee report states that the conferees recognize that amateur licensees do not operate for profit and can play an important public safety role in time of disaster or emergency. There is little chance of the fees being reintroduced on the floor of either house of Congress.

World Bank Goes on the Air

The World Bank Amateur Radio Club is now on the air. Located at the World Bank headquarters in Washington, DC, it joins the ranks of other world organizations, such as the United Nations, with an amateur radio station. It has been granted a special call sign—4U1WB.

4U1WB operates 80 through 10 meters primarily on weekends and at lunch hour on weekdays. No, it doesn't count as DX, but the QSL card is unique and a shack conversation piece. Send QSL cards with an SASE to: The World Bank Amateur Radio Club, 1818 H Street N.W., Washington, DC 20433.

French 6-Meter Activity

French operators have been active during 50 MHz openings lately, throughout the band. Controversy and rumor have been attached to "theories" of authorization for French stations. Recently, K5ZMS offered an explanation based on his direct contact through the SMIRK organization as well as from information provided by the ARRL.

There are 252 French stations which hold official 50 MHz permits. These stations, located near VHF TV transmitters, are permitted to operate above 50.2 MHz. Their callsigns are unique, in that special prefix letters C, D, and E are added. For example, F1EMT becomes FD1EMT.

Also, 100 VHF Experimental Group licenses have been issued. These operators are not required to hold a permit like the above mentioned group, but some do. The Experimental Group license allows the operator to work in the following frequency windows: 50.086–.089, 50.111–.114, and 50.136–.139 MHz.

For now, to be assured of a legal French QSO, look for stations in the proper areas of the band or ask the station to QSY.

Meteor Scatter Communications

Communication at VHF frequencies using the ionized trails left by meteors is expanding rapidly in commercial and military communications. This same type of communication has been used for many years by radio amateurs. Because the ionized trail lasts only a few seconds, communications during meteor showers are normally carried out with high speed CW or single sideband. But now computers have the ability to compress data and send it in automatic high speed bursts, or packets.

Meteors, many as small as a grain of dust, enter the Earth's atmosphere at speeds of up to 45 miles per second. As the meteor reaches about 50–75 miles in altitude, interaction with the atmosphere leaves a short-lived trail of electrically charged ions. When a radio wave strikes the trail, the ions absorb the energy and radiate it back toward the ground.

A meteor scatter communications system, controlled by high speed computers, transmits a continuous "probe" signal for reflective meteor trails. When found, the transmitter then fires its communications burst and asks for an acknowledgment.

Meteor trails offer a communications link highly resistant to disruption by solar storms, nuclear war, and jamming. This system can act as a substitute for communications satellites, which are more vulnerable. The major disadvantage is that you have to wait for a useful meteor-induced reflector to arise. Although several billion meteors enter the atmosphere every day, relatively few are useful as reflectors between any given pair of ground stations.

A national emergency communications network consisting of meteor burst systems is expected to be completed in the very near future, and will be used by government agencies in the event normal communication links are disrupted by manmade or natural disaster.

Retest as a Penalty?

The FCC has been petitioned to make it possible to force a retest on a violator. There has been no action taken at this time, but the petition seems to have merit. What better way to have a violator learn the rules. (And what a lesson!)

BY7WGL in China

Mainland China's newest amateur radio station took to the air last November 4. Station BY7WGL was opened at Guilin, its first QSO with Beijing's BY1PK, during the opening ceremonies. In attendance was a goodwill mission from the Japan Amateur Radio League, headed by Mr. Yoshito Tanaka JA6VVS. Via JARL.

Don't Resist the Change

A reminder from the National Bureau of Standards: the values for the standard ohm and standard volt are changing. Effective 0001 UTC on January 1, 1990 the standard volt will change 9.2 parts per million while the ohm will be adjusted about 1.7 parts per million.

Why is the NBS is going to all this trouble? First, standardization. Currently, four different standard values for the ohm and volt are used worldwide. After the adjustment next January, the entire world will use the same standards. Second, to correct a mistake. In 1972, the last time the values for the standard ohm and volt were adjusted, the values chosen were wrong.

Famous Broadcaster Gets Ticket

Walter Cronkite, well-known retired broadcaster now living in New York City, has received his Novice Class License. Listen on the bands for KB2GSD. Congratulations, Walter.

TNX to QRX Contributors

TNX to NCARC COMMUNICATOR, B-N-T, State of the Arts, Kettle Drums, and Westlink Report.

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The Future is Here!

Kenwood — producing the finest Amateur Radio products for over three decades — introduces you to our world of affordable, high-quality, high performance products for today's active Radio Amateur. From HF to VHF, from base to mobile to HT, there's surely a Kenwood radio that will fit your needs and budget.

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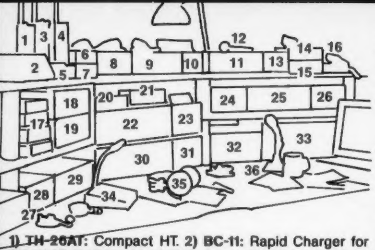

1) TH-26AT: Compact HT. **2) BC-11:** Rapid Charger for TH-26AT. **3) TH-315A:** 220 Deluxe HT. **4) TH-75A:** Dual Band HT. **5) BC-10:** Compact Charger. **6) TM-631A:** 144/220 MHz Dual Bander (shown w/supplied MC-44DM). **8) PS-50:** Heavy Duty Power Supply. **9) TS-440S:** HF Transceiver w/AT-440 (shown w/supplied MC-43S). **10) SP-430:** External Speaker. **11) R-5000:** High Performance Receiver. **12) HS-6:** Small-size Headphones. **13) SP-430.** **14) TM-2530A:** Deluxe 2m, 25 W FM Transceiver (w/optional MC-48B mic.). **15) TM-3530A:** Deluxe 220 MHz, 25 W FM Transceiver. **16) TM-701A:** 144/450 MHz Compact Dual Bander Mobile Transceiver. **17) TM-231A/331A/431A/531A:** 144, 220, 450, 1200 MHz Compact Mobile Transceivers. **18) TS-811A:** 70 cm, 25 W and **19)** 2m, 25 W, All Mode Base Station Transceivers. **20) PC-1A:** Phone Patch (FCC part accepted). **21) SW-2100:** SWR/Power Meter. **22) TS-940S:** Deluxe HF Transceiver w/AT-940 installed. **23) SP-940:** Matching External Speaker. **24) SP-31:** External Speaker. **25) TS-790A:** All Mode Tri-band Satellite Transceiver. **26) PS-31:** Matching Power Supply. **27) PS-430.** **28) AT-250:** External Automatic Antenna Tuner. **29) TS-680S:** 160-6 m Multi-Bander. **30) TS-950SD:** HF Transceiver w/DSP. **31) SP-950:** Matching External Speaker. **32) SM-230:** Deluxe Station Monitor. **33) TL-922A:** HF Linear Amplifier. **34) MC-85:** Multi-function Desk Mic. w/3 outputs and tone controls. **35) HS-5:** Deluxe Headphones. **36) MC-60A:** Base Station Mic.

As the "pacesetter" in Amateur Radio, Kenwood continues to incorporate tomorrow's techniques and innovations into practical products today. Digital Signal Processing (DSP) in the TS-950SD is only one example. SSB Slope Tuning, the original "Dual Bander" concept, built-in antenna tuners for HF rigs, and many other techniques were all developed by Kenwood, and imitated by others. Leading edge technology, and superior field-proven performance — That's the Kenwood Experience!

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Model PK-88
Packet Controller
Advanced Electronic Applications, Inc.

Unique operating features with a proven hardware and software design make AEA's PK-88 your best choice in packet radio - now with MailDrop, an 8KBytes efficient personal Mailbox with selectable third-party traffic. The MailDrop uses a subset of the well-known W0RLI/WA7MBL packet BBS commands. When your PK-88 MailDrop is active, other stations can connect to your PK-88, leave messages for you or read messages from you. You can also store a single message or up to 15 separately numbered messages. Your MailDrop also accepts inbound mail forwarding from your local W0RLI/WA7MBL auto-forwarding packet BBSs.

The PK-88's internal KISS Mode is your direct interface to KA9Q's "NET" TCP/IP protocol suite - a single KISS command presets all packet parameters for TCP/IP operation. AEA's unique Host Mode provides the type of complete interface protocol preferred by many professional programmers for efficient control of the PK-88 by external programs and special applications. Your PK-88 also accepts special "NET/ROM" EPROMs provided by Software 2000, Inc., for Level Three node operation and networking.

In addition to all the features of a "standard" TNC, the PK-88 offers features not found in any other TNC:

- WHYNOT command - Shows reasons why some received packets are not displayed.
- AUDELAY command - Reduces spurious emissions in slow-switching radios.
- "Packet Dump Suppression" - Prevents dumping unsent packets on the radio channel when the link fails.
- Prioritized Acknowledgement (ACK) protocol improves performance on busy packet channels.
- CUSTOM command - Allows limited PK-88 customization for non-standard applications.
- Enhanced MBX command - Permits display of the data in I- and UI-frames, without packet headers and without retries and repeats.
- Enhanced MPROTO command - Suppresses display of non-ASCII packets from Level Three switches and network nodes.
- Unique MFILTER value $80 - Suppresses all graphics and control characters except TAB, CR and LF.
- Unique DFROM command - Permits selective digipeating ("Accept" or "Reject" digipeater operation by call signs).

Specifications:

- Processor: Zilog Z80. RAM: Battery backed, 32K Bytes. ROM: 32K Bytes
- Hardware HDLC: Zilog 8530 SCC

Modem:

- Modulator/Demodulator: AMD 7910 "World Chip"(tm), with differential AM detection and phase-continuous sinewave AFSK generator
- Modulator Output Level: Adjustable, 5 to 300 millivolts RMS
- Input Sensitivity: 5 millivolts RMS
- Input Range: 5 to 770 millivolts RMS
- External Modem Connector for use with external modem
- Hardware Watchdog Timer: One-minute time-out

Rear Panel Input/Output Connections:

- Radio Interface: Locking eight-pin; Receive Audio, Transmit Audio, PTT, Auxiliary Squelch, Ground
- Audio Input/Output: 3.5mm mini-plug
- External Modem: Five pins on DB-25; Transmit Data, Receive Data, Data Carrier Detect, Clock, Ground
- Terminal Interface: Standard RS-232 25-pin DB-25 connector
- Terminal Data Rates: Autobaud settings at 300, 1200, 2400, 4800, 9600. TBAUD adds 45, 50, 57, 75, 100, 110, 150, 200, 400, 600 and 19,200 BPS terminal rates
- HDLC Link Data Rates: 45, 50, 57, 75, 100, 110, 150, 200, 300, 400, 600, 1200, 2400, 4800, 9600, 19200 BPS

Front Panel LED Indicators:

- Converse, Transparent, Command, Send, Data Carrier Detect, Status, Connect, Multiple Connect, Power

Power:

- +12 to +16 VDC @ 550mA, coaxial power connector, (center pin positive), Model AC-1 120 VAC wall adapter available

Physical:

- 7.5"W x 6"D x 1.5"H; Weight 2lbs.,6oz.

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CIRCLE 65 ON READER SERVICE CARD

Enforcing PRB-1

Work together to override restrictive antenna ordinances.

by Gene B. Williams KA7FQW

We all know the value of amateur radio as a public service, especially in times of emergency. Earthquake, fire, flood—if there is a need for solid and assured communications, hams are there to help. Sometimes it's the only reliable communications available—maybe even the only communications.

A few years ago, the city of Mesa, Arizona, was threatened with flooding that could have knocked out all telephone lines in and around the affected area. The City Manager contacted Bill Falk of the Superstition Amateur Radio Club, and within hours local hams had mobilized to ensure continued communications. The City sent a letter of commendation praising the importance of amateur radio.

Then, on January 19, 1989, the City of Mesa adopted a new ordinance which restricted antenna height to 30 feet, with only one such antenna allowed per lot. This wasn't the first ordinance of its kind, and local restrictions of 30 to 35 feet are becoming common. A few areas have gone so far as to prohibit antennas for radio communications entirely. One, in Lakeside Park, Kentucky, prohibited external antennas for radio communications on the basis of aesthetics. However, the same place allowed external antennas for television reception.

PRB-1

The problem had become so severe that the FCC released PRB-1 (September 1985), a ruling that specifies that federal law takes precedence over local law, and that overly restrictive ordinances are against the public good. [PRB-1 is now incorporated in Part 97.15(E).] The Department of Defense added its own part to PRB-1, saying that such restrictions represent a threat to national security and to emergency preparedness.

The excuse often used by local governments who are familiar with PRB-1 is that it talks about allowances "...to accommodate reasonable amateur communications." Although PRB-1 does not specify a minimum height, case precedent and technical expertise prove that the minimum would be 65 feet, and higher in some terrains. Anything below this is automatically a violation of federal statute. Thirty feet might seem reasonable to a local official with little technical knowledge, but from an engineering standpoint it is totally unreasonable by federal statute.

In the past, such restrictions have been fought (and won) on an individual basis. Generally, this requires a great deal of both time and money—something every ham in the area has to face if the tower and antenna exceed the local restrictions.

What happened in Mesa changes all this. When the new ordinance took effect, the Superstition ARC banded together, not to secure variances on an individual basis but to overturn the ordinance entirely.

And they won! The original ordinance was defeated and modified to be more reasonable. This sets a further legal precedent which makes it easier for other communities to declare overly restrictive ordinances illegal. Two cities near Mesa, Glendale and Tempe, are already taking on city hall.

Teamwork, Knowledge, and Coordination

Group action gives strong support for an ordinance overruling. It also reduces the chances of the case ending up in court, and so tends to reduce overall costs.

Your main "weapon" is teamwork. Amateur radio clubs are a natural means of getting together for this purpose. Next, you must know the elements of the ordinance ("ignorance is no excuse"). It's easy to find out about it since it is a matter of public record. You can either buy a copy of the ordinance for a nominal fee, and, in most areas, they'll also be available for study at city hall and the municipal library.

The next step is coordination. Delegate someone in the club or group to take charge of handling correspondence and keeping the membership informed. This person should have experience dealing with red tape, and preferably a degree of written communication skills. Make sure to clearly delineate responsibilities.

No HTs!

Bringing HTs to the town board meeting when you present your case is asking for trouble. If the board or council members get the idea that communications are possible with an HT and rubber duckie, it'll be difficult to convince them that you need a 75-foot tower. Don't expect them to know the difference between local 2 meter communication and long distance HF. If they knew the difference, they would never have allowed the ordinance.

Formal legal assistance is always of value. Superstition ARC was lucky in that a local attorney, Neil Wake KV7O, volunteered his time. If you can do the same, you can greatly reduce costs. Even so, there will be some costs, and taking money from the club funds requires approval of the membership.

Get the ARRL Kit

Your first line of defense is the FCC's PRB-1. You can obtain copies from the FCC in Washington, DC 20554. It was also published in the November 1985 issue of *QST*. Even better, send a 9x12 self-addressed envelope (SASE) with $2.05 in postage attached to the Regulatory Information Branch of the ARRL. Request the PRB-1 kit. This will get you not only a copy of PRB-1, but also copies of other ordinances and other related information.

The efforts of the Superstition ARC in Mesa resulted in the "model ordinance," as it is now known. This ordinance reads as follows, concerning communications towers:

> *a) Such structures shall not be located in the required front yard or in front of the front line of the dwelling or principal building; and*
>
> *b) such structures shall not exceed a height of 10' within the required side or rear yard; and*
>
> *c) such structures shall not exceed a height of 75' within the buildable area; and*
>
> *d) not more than one such structure per lot or parcel shall exceed a height of 30'.*

Sample legal cases are always good, especially when dealing with the City Attorney. Therne v. Lakeside Park, Kentucky (case # 83-218, filed 2-24-87) is a classic. Although there is quite a long list, a couple of other good ones are: Williams v. City of Columbia (SC—case #88-2199-15, 2-28-89); Bodony v. Incorporated Village of Sands Point (NY—case # CV 86-3967).

Clippings and letters of commendation which show the public service side of amateur radio, and the importance of effective communications, will also help, especially if they're from a local source. Your club might be helping a local hospital to run test emergencies. The Red Cross recognizes the value of amateur radio, as does the National Guard and Civil Defense. The local MARS chapter is always a valuable source of support.

Use Patience and Reason

Expect resistance. You'll probably be facing the people who came up with the restriction. They didn't enact it out of malice, but out of ignorance of how important amateur communications are, and what's required to support them.

If their attitude seems unreasonable, respond with reason. Prepare to answer—calmly—every objection with sound, solid reason.

For more information, contact Bill Glaze KA7SUF, care of Superstition ARC, PO Box 1551, Apache Junction, AZ. 85217-1551. Please include a self-addressed stamped envelope (SASE) for response. ■

Gene B. Williams KA7FQW, 19333 E. Ocotillo Rd., Queen Creek AZ 85242.

Contest Quality Headset and Mike

Let your VHF/UHF headset/mike work on HF.

by Keith Stieb VE5XZ

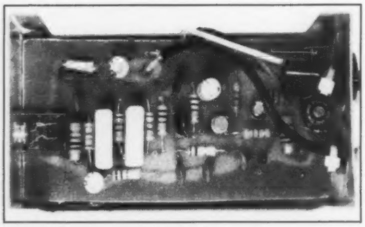

Photo A. Top view of the interface board.

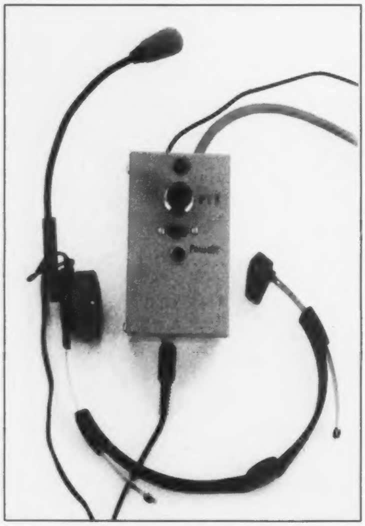

Photo B. The complete VHF/UHF headset to HF rig interface system.

A fellow ham and I were discussing boom microphone/headsets. My friend was considering buying a commercial headset to allow hands-free operation and improve reception (his hearing was a little off). He soon asked, "Why can't I use the headset from my two meter rig?" and I replied, "Why not?" With a few modifications, there was no reason why it shouldn't work! It would also give a dual purpose to the headset, which often just sat on the shelf.

Consequently, we designed an interface and attached it to an HF rig for testing. After a few problems were ironed out, we came up with a very acceptable unit.

Solving the Problems

We first solved the problem of RF getting into the unit by installing liberal RF chokes and bypass capacitors. We thought about putting ferrite beads on each lead, but we didn't try it because the chokes and capacitors solved the problem. We expected the unit to operate at a 2 kW plus level, and it did.

Next, we found, as inherent in electret mikes, that the microphone element responded much too broadly in frequency, especially in that it responds to too low a frequency, down to 25 Hz. This is no problem for VHF FM, but too "bassy" a tone on HF SSB is unacceptable. We designed an audio network and played with it. After some on-the-air testing, we selected a system.

An active filtering system would have been nice, but I opted for a passive system to avoid possible RF problems, such as feedback. (Play with the values of this network and tailor the response for your own preference.)

After the audio shaping network, we added a simple emitter amplifier to increase the audio signal and buffer the passive shaping network from the "loading" effects of the rig. There is NO adjustable gain control (AGC), as the mike gain control on al-

Parts List for Interface

Part	Call Out	RS #	Value	Price ($ CDN)
Resistors	R12	271-306	3.3Ω	4.99*
	R9	271-306	470Ω	
	R1	271-306	560Ω	
	R3,4	271-306	2.2kΩ	
	R10	271-306	4.7k	
	R2,5,7	271-306	10k	
	R8	271-306	100k	
	R11	271-306	1k	
(RS 271-306 is an assortment pack)				
Capacitors	C1,7,13,14	272-801*	0.001μF	2.99*
	C5	272-801*	0.002μF	
	C12	272-801*	0.005μF	
	C8, C10	272-801*	0.01μF	
	C6	272-801*	0.05μF	
	C3,4	272-801*	0.33μF	
	C11	272-1024	4.7mF/35V	0.79
	C2,9,15	272-1025	10.0mF/35V	2.67
*Assortment pack				
Transistor	Q1	276-2009	2N2222A	0.89
Inductors	RFC 1,2,3	273-1601*	1.0mH RFC	2.99*
	Ferrite bead (on base of Q1)	273-1601*		
*Assortment pack				
Bare PC board				1.50
Boom mike jack		274-249		1.39
Mike connector		274-025		3.79
¼" phone plug		274-1536		1.50
Aluminum box		270-239		4.79
PCB standoffs		276-195		1.99
9V bat. connector		270-325		0.35
9V bat holder		270-326		0.45
Mike cable				1.00
Audio cable				1.00
Pwr. switch		275-662		3.99
PTT switch		275-8077		1.75
LED w/case		276-068		1.10
9V battery				1.95
Yaesu YH-1 boom mike/headset				20.00

Total cost of project is $62 CDN ($49 US). Those with junk box parts can expect to spend as little as ½ to ⅓ of the above price. If you have any trouble finding parts at Radio Shack, try All Electronics Corporation in Van Nuys, California.

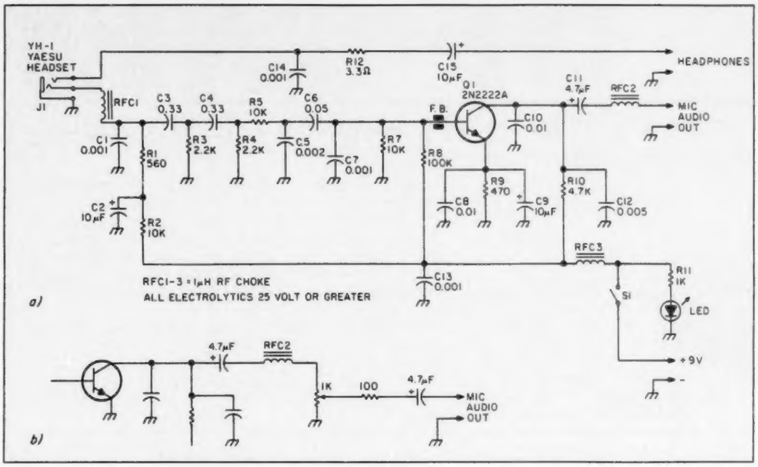
YH-1 YAESU HEADSET
J1
RFC1
C1 0.001
R1 560
C2 10µF
R2 10K
C3 0.33
C4 0.33
R3 2.2K
R4 2.2K
R5 10K
C5 0.002
C6 0.05
C7 0.001
R7 10K
C14 0.001
R12 3.3Ω
C15 10µF
Q1 2N2222A
F.B.
R8 100K
C8 0.01
R9 470
C9 10µF
C10 0.01
C11 4.7µF
RFC2
R10 4.7K
C12 0.005
RFC3
C13 0.001
R11 1K
S1
LED
HEADPHONES
MIC AUDIO OUT
+9V
-
RFC1-3 = 1µH RF CHOKE
ALL ELECTROLYTICS 25 VOLT OR GREATER
a)
4.7µF
RFC2
1K
100
4.7µF
MIC AUDIO OUT
b)

Figure 1. a) is the schematic for the VHF/UHF headset to HF interface unit. b) shows the schematic to install an AGC in the interface.

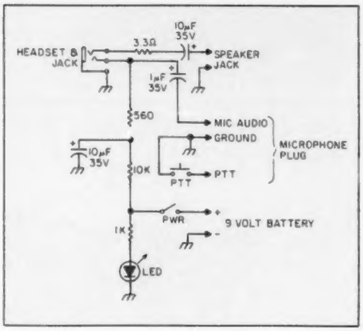
HEADSET & JACK
3.3Ω
10µF 35V
SPEAKER JACK
1µF 35V
560
MIC AUDIO
GROUND
MICROPHONE PLUG
10µF 35V
10K
PTT
PTT
PWR
9 VOLT BATTERY
1K
LED

Figure 2. Circuit to use the interface headset with most VHF/UHF rigs.

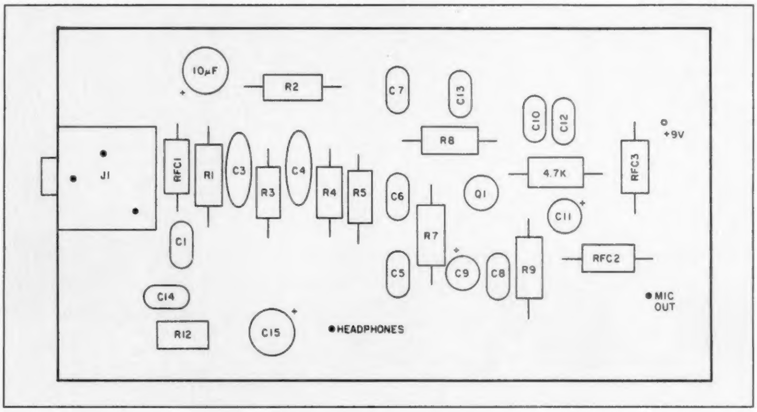
10µF
R2
C7
C13
C10
C12
+9V
J1
RFC1
R1
C3
R3
C4
R4
R5
C6
R8
Q1
4.7K
RFC3
C11
C1
R7
C5
C9
C8
R9
RFC2
C14
R12
C15
HEADPHONES
MIC OUT

Figure 3. Component layout for the interface.

most all HF rigs does a fine job at this. If you want to install an AGC in your interface unit, see the circuit in Figure 1b. Consider also the input impedance of the microphone circuit on your HF rig when making the circuit. Be sure it doesn't get loaded down as you adjust the interface level.

Interface Circuitry

The interface unit consists of three parts. The first part, R1 and R2, and associated parts, is the circuit that supplies voltage to operate the electret microphone.

The second section, consisting of R3, R4, and R5 with associated parts, is the passive audio network that shapes the audio output of the electret mike element.

The third section is the common emitter amplifier/buffer circuit, built around Q1, a 2N2222A transistor. Output impedance of this unit is approximately 600Ω.

We added a PTT switch as an afterthought. There are times, especially with older rigs, when VOX operation is not advantageous. Depending on the rig, the PTT ground connection can be common to the interface ground or separate from it. Some of the newer rigs require separate grounds.

This unit has been interfaced to a variety of rigs with good results. These rigs include: Heathkit SB-102, Yaesu FT-102, and Kenwood TS-830S, 440S, and 940S. All performed well with the unit.

On-the-air tests were very gratifying. We compared this unit to some popular microphones, and in most instances, we could not criticize the headset/mike.

The YH-1 was designed to operate with only specific Yaesu rigs, one of which I know is the FT-727 dual-band HT. You can, however, use this headset/mike with most VHF/UHF rigs. In fact, I made a small circuit (see Figure 2) and interfaced it to several rigs, including the Yaesu FT-230R mobile and FT-23R HT, and all worked fine.

Easy-to-Find Parts

You can buy most of the parts for this unit at Radio Shack. I found all the capacitors, resistors, and RF chokes in their respective assortment packs. An alternative source of parts is All Electronics Corporation of Van Nuys, California.

The YH-1 headset is available from any Yaesu dealer. However, most of the optional headsets for VHF/UHF rigs use electret microphones. I see no reason why, with a couple of minor modifications to the R1, R2 section, you couldn't use this interface with other makes and models of headsets.

You can spend a few dollars and give your headset dual purpose capability on VHF/UHF, and the HF bands. For us, it was well worth the effort! 73

Keith Stieb VE5XZ, currently a firefighter, has been a ham for 18 years. Keith's previous contribution to our pages is his "Heathkit HF Linear Mods" article in the March '88 issue. He teaches at the local radio club. You may reach him at 358–8th St. East, Prince Albert, Sask., Canada S6V-0W2.

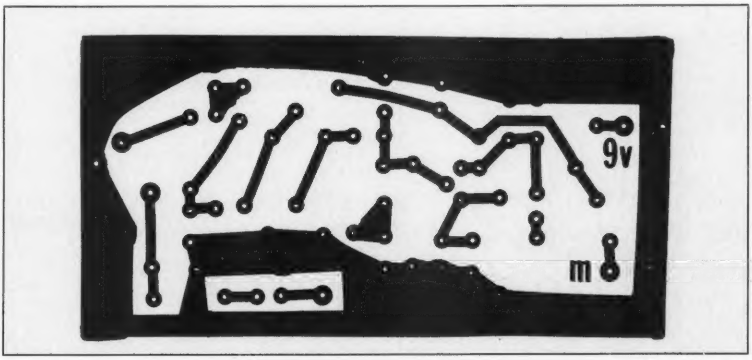

Figure 4. Interface foil diagram.

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MFJ ELECTRONIC KEYER PADDLE

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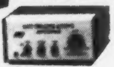

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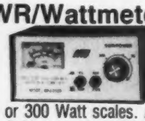

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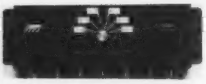

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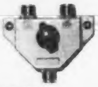
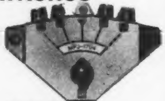


$21.95 MFJ-1702B



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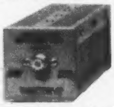

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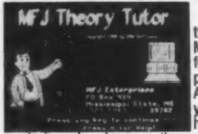

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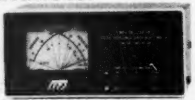

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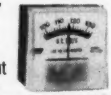

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CIRCLE 86 ON READER SERVICE CARD

73 Review

by Larry R. Antonuk WB9RRT

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Making Circuit Design Easier

I designed and etched my first printed circuit board in May of 1978. The project was a logic pulser, published in a monthly electronics magazine. The article suggested using perfboard, but I wanted a PC board. The circuit had been designed to fit inside a 35mm film canister—miniboxes were expensive back in those days. The resist method used was the only one available: a 99¢ Radio Shack resist pen (a.k.a. Magic Marker). The results were, shall I say, somewhat marginal. However, with a little solder to bridge a few thin spots on the traces, the thing actually worked. I was amazed.

Things change. The above scenario actually flashed through my mind shortly after I booted up Protel Easytrax. As an introduction to the product, the manual suggests that you call up a DEMO file for practice. The DEMO is a "simple Z80 microcomputer layout". This "simple" layout has 12 ICs, two dozen miscellaneous components, 518 holes, 423 pads, and 1544 segments of track. The time lapse between hitting "return" and the point where the layout was completely drawn was slightly under three seconds (using a '386 laptop, with math coprocessor, running at 12.5 MHz). Want to zoom in on a specific section of the board to erase, rescale, or make a change? Just call down the menu, hit the appropriate command, and wait about a tenth of a second. Things move fast these days.

Easytrax is Protel's low-cost, easy-to-use package, but its capabilities are far from limited. Maximum board size is 32" x 32". Each board may contain up to six signal layers, power and ground layers, and a component overlay. Pad size, track width, and text height are all variable. Entire blocks of the layout can be marked off, and then moved or rotated—existing tracks "stretch" as required. The program serially designates each component as it's placed on the board (U1, U2, etc.) and creates a separate file listing the number of components, their designation, and location. This information can later be converted to a Bill of Materials by using an included utility program.

The most important characteristic of any tool is its ease of use. Protel Easytrax is menu-driven but, as with any tool this complex, you will need to read the manual. The manual contains a step-by-step tutorial that guides the user through the steps of creating and plotting a layout.

> *"However, for the experimenter who builds even five boards a year, the savings in time will be considerable."*

To get some idea of the "friendliness" of the program I ran a simple benchmark test. First, I went through my files and dug out the schematic of the ol' logic pulser (one 14-pin DIP, six caps, five resistors, and two switches). Totally disregarding the tutorial, I sat down at the keyboard (sound familiar?). With virtually no previous CAD experience to my credit, I began laying out the circuit, looking up information and commands as needed. The first layout took me one hour and twenty minutes. Clearing the screen and starting from scratch, I produced the same layout again in just under twenty minutes. One week later, the same project took eleven minutes. Regardless of the time, the frustration level decreased with each use. Conclusion #1: This is an easy-to-use program. Conclusion #2: You'll save time in the long run if you use the tutorial.

An included separate program called Easyplot lets you print or plot the finished layouts created with Easytrax. Two programs are needed because of the length of time required for complex plots. Once you create a file, you can move it to another computer, run Easyplot, and plot the layout. This way you don't tie up your main computer, allowing you to do more design work. (Easytrax disks are not copy protected, but the program comes with an external program protection device or "key" that plugs into the printer port. The Easytrax portion will run only with the "key"—Easyplot runs without the use of a "key.")

The highest quality plots are produced on plotters or laser printers; the resolution of a dot matrix printout leaves something to be desired. If a dot matrix printer is all that's available, this limitation is easily overcome by changing the scale on the print routine to produce a twice normal size layout. This can then be reduced on a copy machine by fifty percent to greatly increase the finished resolution. Of course, this trick reduces the possible size of the finished board to one-half the size of your dot matrix printer paper, but this should still be sufficient for most hobbyist applications.

Yes, It's Worth the Price!

At first glance, some hams may have trouble justifying $395 for their own copy of Protel Easytrax. However, for the experimenter who builds even five boards a year, the savings in time will be considerable. If that time is spent writing those projects up as magazine articles, the program could easily pay for itself in a few months. Compared to conventional methods, Easytrax is so easy to use that it's worth doing just about anything to get your hands on it.

Ham Economics dictates frugality, so how about getting the ham club to buy a "floating" copy, and have a club member plot the finished files at work? Or maybe you could talk the boss into getting a copy for those occasional projects, and letting you borrow it in between. The options are many, but the bottom line is that once you've used Protel Easytrax you'll never go back to conventional PC board layout methods again.

Larry Antonuk WB9RRT has written numerous reviews on test equipment and electronics books. He currently works as a project manager for a land mobile service shop in Keene, New Hampshire. He enjoys home-brew projects, experimentation, and instrumentation. Contact him at P.O. Box 452, Marlborough NH 03455.

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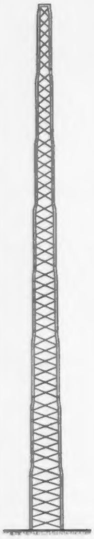

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155BAS:	5-el, 15 M. beam
105BAS:	5-el, 10 M. beam
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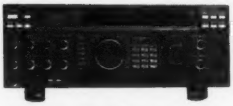

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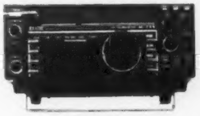

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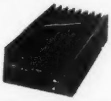

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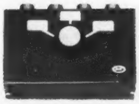

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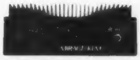

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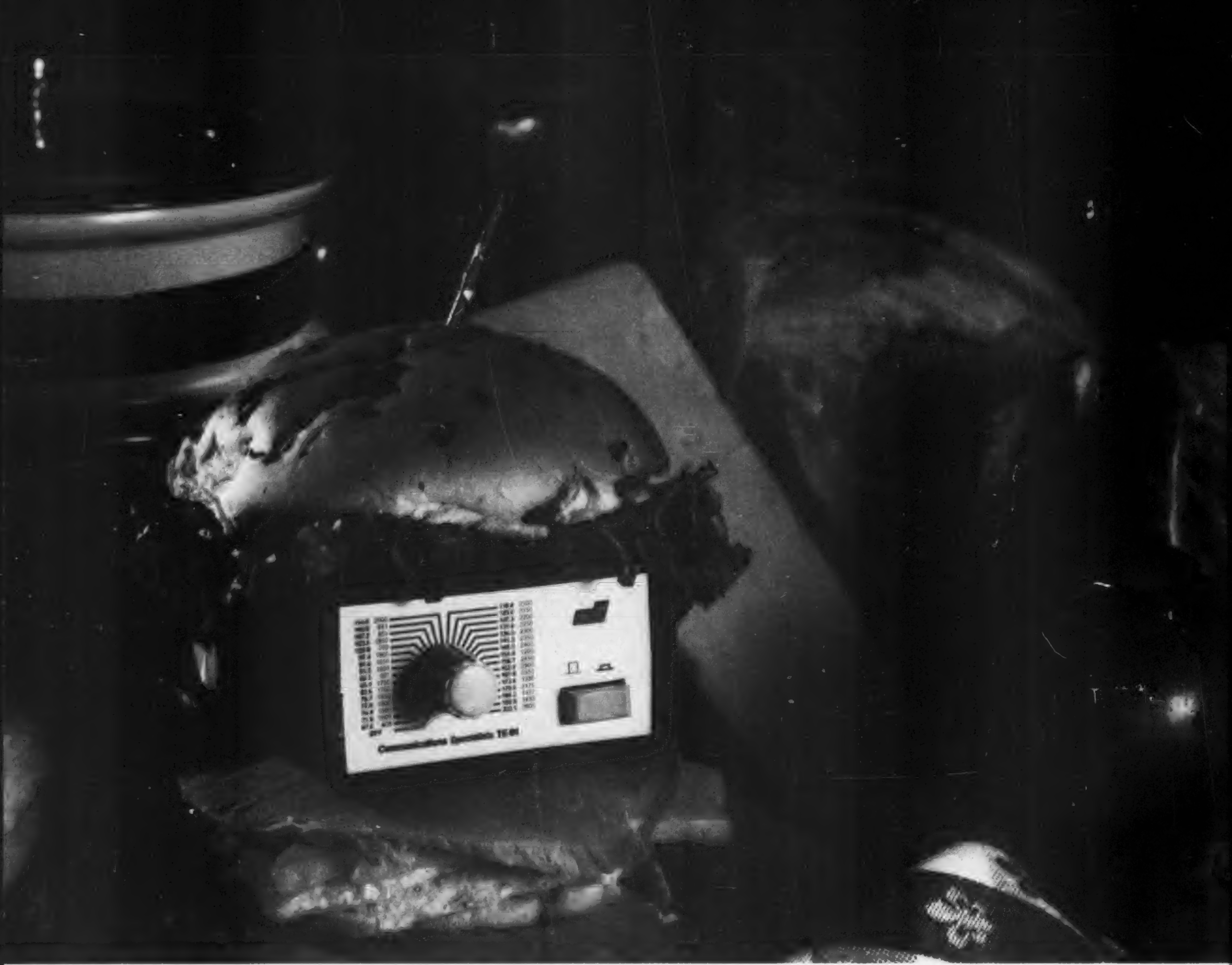

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Number 7 on your Feedback card

HAM PROFILES

There are no "average" hams!

Ham with a Dramatic Past

Dale Shimp W9LOV earned his amateur radio license in 1940. He joined the New Trier (Illinois) High School Amateur Radio Club and Broadcasting Club. One of his classmates in the Broadcasting Club was Charlton Heston. After graduating in 1941, he briefly attended Northwestern University, took an advanced technological radio course, then went to work for the recording studio that transcribed the very popular radio show of the day: "Bob Elson Aboard the Twentieth Century Limited."

After that he played the young hero on a bloodcurdling radio mystery show on WHIP where he was stabbed, shot, strangled, and always died before the end of the show. He was given the stage name of "Henry Dale." Next, he worked as a sound effects man at the same station until he moved to the Engineering Department of WJWC. There he worked with Clifton Utley and played practical jokes on Mike Wallace.

After a stint in the U.S. Army he came home to a job in the Engineering Department at WLS and stayed for 43 years, the longest term and possibly the oldest employee of that radio station. He is now retired from that job.

Dale is one of the founders of the Bear Repeater group, and he's now its Trustee, Director, and Treasurer. He has been a part-time Sergeant in the Morton Grove Park District Police for 22 years. He's also a photographer, a treasure hunter, and a fisherman. He and his wife Margit have two children and three granddaughters. Incidentally, after he was married, Dale learned that he had been adopted. He was reunited with his two sisters and his brother, who is also a ham! (Biography by Angelo Polvere KA9CSO.)

Another Reason to Check Out the School Net

Mary Alestra KB2IGG is 11 years old and in the seventh grade at Intermediate School 72 in Staten Island, New York. She became interested in ham radio through her friends in Carole (WB2MGP) Perry's "Introduction to Amateur Radio" program at the school.

When she was a sixth grader, Mary would come to the school's hamshack (Does your local school have a hamshack? If not, get working on it!) early in the morning to work with Carole and to get experience listening and speaking on the air. Studying on her own, Mary passed the Novice exam and is now working hard to upgrade. Mary gets on the air every morning, talking to hams on the local repeaters. She has also participated in the "CQ All Schools" net Tuesdays and Thursdays at 17.30 UTC on 28.303 MHz.

Mary loves animals and has many interesting pets, including two gerbils and a snake. She loves to draw and to create cartoon figures. Mary plans to pursue a career in communications.

FEEDBACK

In our continuing effort to present the best in amateur radio features and columns, we recognize the need to go directly to the source—you, the reader. Articles and columns are assigned feedback numbers, which appear on each article/column and are also listed here. These numbers correspond to those on the feedback card opposite this page. On the card, please check the box which honestly represents your opinion of each article or column.

Do we really read the feedback cards? You bet! The results are tabulated each month, and the editors take a good, hard look at what you do and don't like. To show our appreciation, we draw one feedback card each month and award the lucky winner a free one-year subscription (or extension) to *73*.

To save on postage, why not fill out the Product Report card and the Feedback card and put them in an envelope? Toss in a damning or praising letter to the editor while you're at it. You can also enter your QSL in our QSL of the Month contest. All for the low, low price of 25 cents!

Feedback#	Title
1	Special Events
2	Never Say Die
3	QRX
4	Enforcing PRB-1
5	Home-brew: Contest Quality Headset and Mike
6	Review: Protel Easytrax
7	Ham Profiles
8	San Francisco Quake '89
9	Review: Ramsey SA-7
10	Review: IC-765
11	Review: Alinco DR-570T
12	Review: AEA MX-6S
13	Review: Ultra Comshack 64
14	Review: AEA MM-3
15	Review: MFJ's 941D Versa Tuner II
16	Home-brew: Spectrum Analyzer
17	Above & Beyond
18	RTTY Loop
19	Hamsats
20	Review: IC-725
21	Letters
22	Packet Talk
23	Book Review: Tune in on Telephone Calls
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35	Ham Help
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37	de K6MH
38	Propagation
39	QRP

Number 8 on your Feedback card

The Great San Francisco Quake '89

Hams fulfill the purpose of the amateur radio service.

by Bill Pasternak WA6ITF

Within minutes of the October 17, 1989 earthquake, hundreds, maybe thousands, of amateur radio operators responded statewide and nationwide. While Pacific Bell Telephone suffered little damage, the lines into and out of San Francisco were jammed. According to a telephone company spokesman on the ABC news, some 25,000,000 callers attempted to reach San Francisco almost instantly. The number of callers continued unabated for three days. For the average citizen trying to find out about his loved ones or friends, there was only amateur radio to turn to.

Thousands of "health and welfare" messages flowed into and out of San Francisco and areas to the south. The hours of preparedness drills paid off for those who devote themselves to emergency communications. Statewide nets responded almost instantly, with long-haul nets close behind.

Digipeating Packeteers

According to Lew Jenkin N6VV, president of the Northern California Packet Radio Association, digital, rather than analog, communications prevailed. "We had it coming in on AMTOR; on packet via HF nets; and it could be easily warehoused in the devastated area, then worked [delivered] at the convenience of the folks there."

Jenkin added that the ability to 'digipeat' by every ham running packet offered many advantages over conventional voice repeaters with traffic on VHF and UHF: "No other mode gave that form of audit trail and trackability. And the adaptive nature of the networks—not having to rely on one repeater—let us switch [work around it] when we lost one of our major nodes down at Crystal Peak; we just brought up additional nodes. We were able to create a new path into areas where we needed to get traffic . . ."

Digital-Analog Cooperation

One of the long-running bones of contention between digital and analog amateur communications has been the self-imposed isolation between the two. The ARRL has tried to remedy this by asking voice repeater coordinators to take on packet and digipeater coordination, but virtually all have declined. This has led to even further isolation. But in California, this isolation ended when the quake began to rumble.

N6VV seems to feel things have changed: "The combination of the automatic routing capability of packet and the appropriate use of the FM networks . . . made it work. When we got word [via packet] of emergency relief supplies from Los Angeles, the first thing we did was to get on 2 meters [FM voice] and contact the E.O.C. in Santa Cruz, which passed that traffic on the Loma Prieta machine . . . Meanwhile, 'health and welfare' traffic was flowing [on packet] all of the time that the [voice] conversation was going on."

But there were some reports of packet-oriented hams being a bit too zealous about proving the importance of their favorite mode at a time when they should only have been worrying about getting messages through. Several apparently showed up at disaster coordination sites armed with radios and TNCs, but no microphones. They insisted that packet was better than voice for 'tactical' amateur radio communications from the streets.

Jenkin thinks this was a pretty bad idea: ". . . The general reaction up here was that talking keyboard-to-keyboard in an emergency situation was not that effective. There may be some isolated cases where we will see that it worked. But what we did was to try to get some people with portable packet gear into the affected areas to take 'health and welfare' outbound traffic . . ."

The Lifeline for the City

The quake's epicenter was near the once-picturesque town of Santa Cruz some 50 miles away. Santa Cruz was devastated and cut off. Also hard hit was the city of Hollister. A day after the quake, NBC Network News producer Alan Kaul W6RCL visited the Red Cross Evacuation Center in Hollister with a camera crew for *Nightly News*. Alan and crew came across an amateur radio station that was literally the lifeline for the city. Al was very moved by what he saw, and called *Amateur Radio Newsline* with the following story:

"One of the Red Cross Centers was at the San Andreas High School in Hollister, California, about 30 miles east of the earthquake epicenter. Hollister is the so-called 'earthquake capitol of the world' because it is at the junction of three of California's most active faults—the Caliveras, the Heyward and the San Andreas. Officials here were ready for a quake. They had rehearsed just three months before.

"RACES member Al Romeo N6OJO of San Jose was one of the volunteers who ran the amateur station at the San Andreas School. Forty families whose homes were now unsafe had moved into the shelter. N6OJO, N6RCO, N6DDM and WA6BWT took turns providing coordination. Much of the effort involved keeping the shelter in contact with Red Cross headquarters about fifty miles away near San Jose. They had a packet radio system and were prepared to handle health and welfare messages on HF and VHF radio.

"The amateur radio operation was manned around the clock for about forty hours until power and telephone links were restored. And what type of messages do radio amateurs handle during an emergency like the quake? One order via 2 meter radio in San Francisco was to a drugstore for the purchase of three hundred desperately needed baby bottles."

Alkaline Batteries Last Longer

What did N6OJO learn from his experiences in the quake? Not to rely on NiCd batteries. There was no good way to charge them when the power was off for so many hours. He said that dry-cell, alkaline batteries last much longer, and he suggests that anyone preparing for an emergency stock up on them.

The Condor Connection

Given the 220 MHz controversy, it's ironic that the statewide backbone of amateur radio emergency communication was not HF, but rather the 220 MHz statewide open interlink called the Condor Connection. Designed and built by Mark Gilmore WB6RHQ and the late W6TLG, the Condor Connection covers the state from San Francisco/Sacramento to the US-Mexican border, and east to Arizona and Nevada. This open system functions as a three-state super-repeater with the ability to handle massive amounts of voice traffic free of the kinds of natural and manmade interference often hampering HF links. WB6RHQ had engineered Condor to withstand a quake

Continued on page 83

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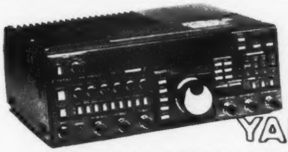

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TS440S/AT, R-5000, TS-940 S/AT, TM 231A/431A, TM-2570A/50A, TR-751A, Kenwood Service Repair, TM-731A, TS-711/811A, TM3530A, TH205AT, TH215A, TM-631A, TM-331A, TS140S, TS680S, RZ-1, TS-790A, TS950SD, TH-75A

YAESU
FT-23/73
FT411-811
FTC-1903/1123
FTH-2005/7005

ICOM
IC2/3/4SAT
IC02AT/32AT
IC2/4GAT
IC-A2/U16

Landmobile HT's
ICOM: U16, H16, V100, U400
MAXON, MOTOROLA,
YAESU: FTH 2008/7008
UNIDEN, REGENCY, KING,
MARINE ICOM: M5, M56, M700
AVIATION ICOM: A20 H.T., TAD

IC-32AT · IC-H16/U16 · Motorola Radius P-100 · TH-75AT · FT-470

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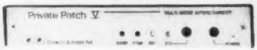

PRIVATE PATCH V, Duplex 8000

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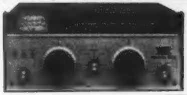

Ten-Tec
Tuner 238

MICROLOG-ART 1, Air Disk, SWL, Morse Coach

AR 900 Hand Held Scanner 100 ch. Covers 27–54, 108–174, 406–512, 800–950 MHz

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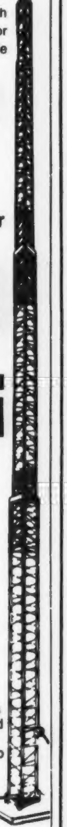

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CIRCLE 41 ON READER SERVICE CARD

Number 9 on your Feedback card

73 Review *by David K. Pelaez AH2AR/8*

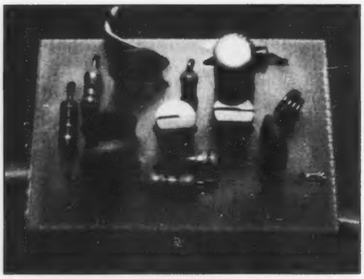
Ramsey SA-7 Broadband RF Amplifier

Ramsey Electronics
793 Canning Parkway
Victor NY 14564
(716) 924–4560
Price Class: $15.00

A hot little amplifier at an extremely low price.

The SA-7, new from Ramsey Electronics, is an easy-to-build kit for a general purpose broadband RF amplifier, capable of operating from 100 kHz to 1 GHz. It's small on price, but big on performance.

After searching high and low (no pun intended) for an inexpensive preamp to help boost the front end of a tired shortwave communications receiver, I came across the Ramsey Electronics advertisement announcing several new "mini-kits." The SA-7 preamp kit was inexpensive, so I took the plunge and ordered it. One week and $15.00 later, I received a curiously small parcel from Ramsey.



Top view of the assembled Ramsey SA-7 broadband RF amplifier.

Assembly

The SA-7 is easy to assemble. There are only 15 components to mount on a phenolic circuit board measuring 1¼" x 1⅜". I put it together in about 15 minutes using just a soldering iron, a steady hand, and about an inch of solder. You won't need to use any tuning or test equipment after completion. Even a first-time kit builder can tackle this project with confidence.

But, even as a "veteran" kit builder, I almost forgot to install the kit's only SMT (surface mount technology) resistor. After assembling and soldering all the components on the PC board, you must solder the SMT resistor between the two designated foil traces on the foil side of the board. Remember also to keep all of the other component leads as short as possible if you want to exploit the amplifier's capabilities on the "high end" of its range. Long component leads may also cause it to break into oscillation.

Amplifier Application

After mounting the SA-7 within an Allied AX-190 receiver, I put in a jumper within the receiver's power supply and borrowed approximately 9 volts to run the newly installed amp. Current drain is minimal (less than 50 mA) and the power requirement for this amp is 8 to 15 volts DC. Since this voltage is available in most solid-state equipment, it's a snap to use the available power already present within the gear. The extra current drain usually won't be noticed. If you opt to use the SA-7 in a tube rig, a 9 volt battery or an outboard power supply would be an alternative solution.

After turning on the receiver with the SA-7 in line, I was pleasantly surprised to notice a marked increase in the number of stations on the air. I noted a solid two S Unit jump in signal strength throughout the HF receiver's range. Stations barely audible with the SA-7 out of line came up to "armchair copy" when the amp was put between the antenna and receiver. I noted an increase in the noise floor, but the two-plus S Unit increase in received stations' signal strength more than compensated for the associated and expected increase in the receiver's noise floor. The spec sheet indicated a 3 to 5 dB noise figure.

Technical Information

When preamplifiers are added to a receiver, images and heterodynes may appear, especially if the preamps don't have selective filtering as part of their design. At VHF and UHF frequencies, images can become a real problem when the receiver and antenna are located near crowded RF environments. Some preamps may end up acting like broadband mixers. I didn't notice this with the SA-7, but it could become a problem.

The design of the SA-7 is simple and straightforward, and the addition of helical filters or tuned circuits would totally defeat the idea of keeping this kit under the $15.00 mark. This amplifier contains two stages (with no tuned elements): a common emitter stage which drives an emitter-follower by utilizing two 2SC 2570s. Page 17 of the ARRL publication, *Hints and Kinks for the Radio Amateur*, circa 1975, described a similar circuit design as a "general purpose preamp." This publication stated that a common emitter-follower stage tends to be unstable but, as explained in the *Handbook*, the absence of tuned elements allows for extremely good stability.

Listed specifications claim a gain of 15 dB at 1 to 950 MHz and 8 dB at 1300 MHz. The SA-7 can be used in many applications requiring extra gain in a wide variety of amateur and general coverage receivers. It can also be used to increase the sensitivity of frequency counters. Because of its small size, the SA-7 can be used internally in almost all receivers, or placed in a small chassis, for a variety of applications within the hamshack.

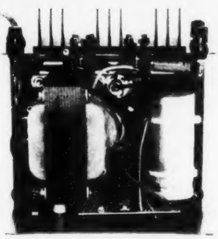
A Good Deal

On a scale of 1 to 10 (*not in dB*), I would give this little broadband RF amp a 10!! Now, I wonder if the SA-7 would work in boosting the horsepower in my Ford Ranger?!?

Contact Dave Pelaez AH2AR/8 at 4872 Trailside Court, Huber Heights OH 45424.

ASTRON CORPORATION

9 Autry
Irvine, CA 92718
(714) 458-7277



INSIDE VIEW — RS-12A

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- MAINTAIN REGULATION & LOW RIPPLE at low line input Voltage
- HEAVY DUTY HEAT SINK • CHASSIS MOUNT FUSE
- THREE CONDUCTOR POWER CORD
- ONE YEAR WARRANTY • MADE IN U.S.A.

PERFORMANCE SPECIFICATIONS

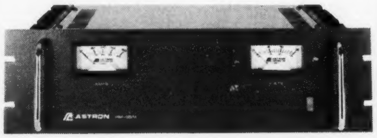
- INPUT VOLTAGE: 105-125 VAC
- OUTPUT VOLTAGE: 13.8 VDC ± 0.05 volts (Internally Adjustable: 11-15 VDC)
- RIPPLE Less than 5mv peak to peak (full load & low line)
- **Also available with 220 VAC input voltage**

MODEL RS-50A

MODEL RS-50M

MODEL VS-50M

RM SERIES



MODEL RM-35M

19" × 5¼ RACK MOUNT POWER SUPPLIES

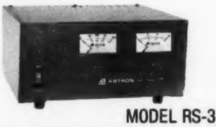
MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RM-12A	9	12	5¼ × 19 × 8¼	16
RM-35A	25	35	5¼ × 19 × 12½	38
RM-50A	37	50	5¼ × 19 × 12½	50
• Separate Volt and Amp Meters				
RM-12M	9	12	5¼ × 19 × 8¼	16
RM-35M	25	35	5¼ × 19 × 12½	38
RM-50M	37	50	5¼ × 19 × 12½	50

RS-A SERIES

MODEL RS-7A

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-3A	2.5	3	3 × 4¾ × 5¾	4
RS-4A	3	4	3¾ × 6½ × 9	5
RS-5A	4	5	3½ × 6⅛ × 7¼	7
RS-7A	5	7	3¾ × 6½ × 9	9
RS-7B	5	7	4 × 7½ × 10¾	10
RS-10A	7.5	10	4 × 7½ × 10¾	11
RS-12A	9	12	4½ × 8 × 9	13
RS-12B	9	12	4 × 7½ × 10¾	13
RS-20A	16	20	5 × 9 × 10½	18
RS-35A	25	35	5 × 11 × 11	27
RS-50A	37	50	6 × 13¾ × 11	46

RS-M SERIES



MODEL RS-35M

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
• Switchable volt and Amp meter				
RS-12M	9	12	4½ × 8 × 9	13
• Separate volt and Amp meters				
RS-20M	16	20	5 × 9 × 10½	18
RS-35M	25	35	5 × 11 × 11	27
RS-50M	37	50	6 × 13¾ × 11	46

VS-M AND VRM-M SERIES

MODEL VS-35M

- Separate Volt and Amp Meters • Output Voltage adjustable from 2-15 volts • Current limit adjustable from 1.5 amps to Full Load

MODEL	Continuous Duty (Amps)			ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
	@13.8VDC	@10VDC	@5VDC	@13.8V		
VS-12M	9	5	2	12	4½ × 8 × 9	13
VS-20M	16	9	4	20	5 × 9 × 10½	20
VS-35M	25	15	7	35	5 × 11 × 11	29
VS-50M	37	22	10	50	6 × 13¾ × 11	46
• Variable rack mount power supplies						
VRM-35M	25	15	7	35	5¼ × 19 × 12½	38
VRM-50M	37	22	10	50	5¼ × 19 × 12½	50

RS-S SERIES

MODEL RS-12S

- Built in speaker

MODEL	Continuous Duty (Amps)	ICS* Amps	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-7S	5	7	4 × 7½ × 10¾	10
RS-10S	7.5	10	4 × 7½ × 10¾	12
RS-12S	9	12	4½ × 8 × 9	13
RS-20S	16	20	5 × 9 × 10½	18

*ICS—Intermittent Communication Service (50% Duty Cycle 5min. on 5 min. off)

CIRCLE 16 ON READER SERVICE CARD

73 Review

by Michael Cobuccio WA1EYP

The ICOM IC-765

The DDS unit makes the difference.

ICOM America, Inc.
2380–116th Ave. N.E.
Bellevue WA 98004
Tel. (206) 454-7619
Price Class: $3150

The ICOM IC-765, quietly receptive.

A few months ago, a friend invited me over to see ICOM's new IC-765 all-mode, all-band rig. I was immediately impressed by the receiver's quietness, but I wondered what else was different from its predecessor, the IC-761, to warrant the price increase.

After examining the rig inch by inch, I concluded that the IC-765 is a finished version of the IC-761. It has many desirable features missing from the latter. Right away, I ordered an IC-765 of my own.

The unit I'm reviewing is from the first production run, SN# 0001132. I installed option modules FL-53A and FL-101, FL-102 filters, a CR-282 high stability crystal unit, and the UT-36 voice synthesizer module.

Like the 761, the IC-765 has its own AC power supply, antenna tuner, and general coverage receiver. However, the options available for this rig are the same as those for the IC-781. The IC-765 is like an IC-781 without the scope and second receiver.

Scanning the IC-765

Here, ICOM added a digit to the digital frequency readout for display accuracy. ICOM has also expanded memory capabilities to 100 banks and improved frequency control, including a smoother feel in the variable tuning rate.

ICOM's "band stacking registers" ensure that the micro-processor remembers the last frequency your VFO dial was on before you switched to another band. The IC-765 has an additional register for what appears to be the general coverage band. It doesn't have a HAM/GENE coverage switch. ICOM's CPU unit now recognizes a ham band from a general coverage band, allowing the operator to use its memory more liberally.

Unlike the IC-765's less expensive cousin, the IC-725, you cannot program the main dial frequency step size. To offset that deficiency, ICOM provides a DIP switch under the bottom cover that allows you to select the frequency travel of the main tuning dial to either 5 kHz or 2.5 kHz per revolution. Overall it looks like ICOM has put substantial efforts into improving their frequency control features.

The Dawn of DDS

The IC-765 contains ICOM's newest chip, the DDS, or direct digital synthesizer, a significant contribution to HF design. Though my ear cannot measure any improvement in frequency stability, the receiver's so quiet that when no signals are present I sometimes think the radio is off. This is similar to Ten-Tec's Omni-V. ICOM's published noise floor, a value that measures how much noise or hash the receiver circuits produce, which could interfere with an extremely week incoming signal, is around −140 dB.

What is the difference between the DDS chip and a PLL system? In both cases, the microcomputer in your HF rig periodically loads your rig's frequency control logic with digital data that corresponds to your rig's current frequency. In the PLL system, this data in turn changes the output frequency of the rig's phase-lock loop system which usually serves as the rig's master oscillator system. With a typical "digital" PLL, the output is somewhat squared; the sine wave contains a series of minute steps which together "simulate" a sine wave. These squared waves contain PLL switching noise, the frequency correction switching, and harmonics typical to square waves.

The DDS chip, a kind of digital-to-analog converter, generates as close to a "real" sine wave as possible—NOT a squared, steplike sine wave. The result is the frequency stability of a digital PLL system and the low noise and harmonic content of a traditional oscillator circuit. All of the rig's circuits and low noise components benefit immediately.

On the receiver side, ICOM has added to its general coverage front-end a three-step incoming signal attenuator quite useful on 75 meters in the evening here in New England. The existing preamp on position is on this same knob, of course. The audio tone control has migrated from its larger knob style to a push button, recessed control on the bottom left. In its place is a CW pitch control which I have found quite useful, especially when copying Morse code with multimode data controller equipment like the AEA PK-232. You can vary the audio frequency of a received CW signal without changing the actual VFO frequency. This means you can vary CW tone pitch when using a very narrow CW filter, say 250 Hertz. Ordinarily, varying the VFO frequency would cause you to drop out of its passband and consequently lose the signal.

No More Presets

The antenna tuner no longer has any presets. Hurrah! How I hated adjusting the tuner presets on the IC-761 and an AT-500 I once owned. This new, lightning-fast tuner memorizes the tuner setting on each band. It then uses the memorized setting as a tuning start point or the nominal 50Ω setting next time you come back to that band. I have tried the tuner with a number of offbeat coaxially fed wire antennas, and I've found a match every time. ICOM's tuner matching range appears somewhat conservative.

With the elimination of all the tuner preset controls, the under-the-cover controls now number only five: MARKER ON/OFF, CALIBRATOR, ELEC-KEY WEIGHT, ANTI-VOX, and SCAN SPEED.

Key Convenience

ICOM also added a transmit microphone tone control to the bank of push button controls on the bottom lefthand corner of the front panel. This appears to be a set-once-and-leave-alone control. I guess ICOM has realized that not many amateurs want a complicated desk mike, like the SM-10, when a simple tone control could suffice in 90% of all cases.

One really nice convenience for an old straight-key hack is the inclusion of a straight key jack over and above the usual electronic key jack. Instead of wondering which is tip or ring, as with previous ICOM HF rigs, and miswiring the plug in the process, ICOM has made it almost foolproof. And you can choose your style of keying.

ICOM has moved the FUNC key to the former position of the HAM/GENE and replaced it with an SSB mode key. As a result, all the rig's modes are available with a single keystroke rather than the previous FUNC + key sequence for some modes. Some of the mode keys include a narrow mode on the second press of the same mode key. Narrow bandwidths are available on the CW, RTTY, and AM modes while a second press of the FM key activates the FM tone encoder.

A 250 Hz super narrow CW filter select has been added which is only active in CW narrow mode. The familiar passband tuning control

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Complete kit, SG-7 **$89.95**

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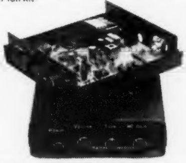
RADIOS



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20 MTR receiver kit HR-2	40 MTR receiver kit HR-4	80 MTR receiver kit HR-8	Receiver case CHR
$24.95	$24.95	$24.95	$12.95

QRP TRANSMITTER KITS, 20, 40 & 80 METERS

Operate a mini ham shack. These little CW rigs are ideal mates to our 40 and 80 meter receivers. Features include smooth variable tuning, one watt output and excellent keying characteristics. Runs on 12 VDC and is VSWR protected. See how far you can stretch your signal with one of these mini rigs. Optional ABS cases are available.

20 MTR QRP Kit QRP-20	40 MTR QRP kit QRP-40	80 MTR QRP kit QRP-80	Case kit CQRP
$29.95	$29.95	$29.95	$12.95

AIRCRAFT RECEIVER KIT

Hear exciting aircraft communications—picks up planes up to 100 miles away. Receives 110—136 MHz AM air band, varactor tuned superhet design with AGC, ceramic filter and adjustable squelch. Runs on 9V battery, 50 mw audio output, 1 μv sensitivity. Optional matching ABS plastic case lets you take it anywhere, features screened graphics and machined aluminum knobs for a real professional look. Compact—great for airshows or for just plain hanging around the airport.

Complete kit, AR-1 **$24.95** Receiver case kit, CAR-1 **$12.95**

SHORTWAVE RECEIVER KIT

A fantastic receiver that captures the world with just a 12" antenna! Receives 4—11 MHz in 2 MHz bands, varactor tuned, superhet design with AGC, RF gain control, and 50 mw audio output. Uses new Signetics mixer chip for less than a microvolt sensitivity, runs on 9V battery. This is a fascinating scout, school or club project, and will provide hours of fun even to the most serious DX'er. Add the optional case kit and you have a real nice looking shortwave set.

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2 MTR kit FR-7	10 MTR kit FR-10	220 MHz kit FR-20	Receiver case kit CFR-7
$29.95	$29.95	$29.95	$12.95

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BROADBAND PREAMP

A sensitive all purpose preamp, ideal for scanners, TV sets, VHF, UHF rigs, counters, etc. Features low noise, 4 db NF, 20 db gain, 100 KHz—1 GHz operation. Runs on 9—12 VDC, 50 ohms input.

Complete kit, SA-7 **$14.95**

LIGHT BEAM COMMUNICATORS

Transmits modulated infrared light up to 30 feet without lenses, up to 1/4 mile using lenses. Uses 30 KHz carrier for hum-free operation, transmits thru windows, etc. Ideal for "bugs" or listening to IR remote controls. Transmitter has sensitive mike input, receiver uses PIN detector and drives speaker output. Units operates on 9—12 VDC.

Transmitter kit, LB-6 **$8.95**
Receiver kit, LB-5 **$9.95**

HIGH POWER FM WIRELESS MIKE

A high power unit that will transmit up to 1/2 mile to any FM broadcast radio. Sensitive input accepts any type of mike, will pick up normal voices 10 feet away using the available mini-electric mike cartridge. Operates on 9—12 VDC

FM-4 kit **$12.95**
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PR-2 COUNTER PREAMP

The PR-2 is ideal for measuring weak signals from 10 to 1,000 MHz • flat 25 db gain • BNC connectors • great for sniffing RF • ideal receiver/TV preamp • 3 db NF

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Extends the range of your present counter to 1.5 GHz • 2 stage preamp • divide by 1000 circuitry • super sensitive (50 mV typical) • BNC connectors • 1.5 GHz in, 1.5 MHz out • drives any counter.

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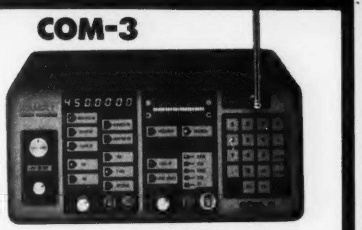
COM-3



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THE COMMUNICATIONS SERVICE MONITOR THAT WORKS HARDER FOR LESS.

Introducing COM-3... the new service monitor designed by service technicians for service technicians. It works harder for less... giving you advanced testing capabilities at a very affordable price. FEATURES • Direct entry keyboard with programmable memory • Audio & transmitter frequency counter • LED bar graph frequency/error deviation display • 0.1-10,000 μv output levels • High receive sensitivity, less than 5 μv • 100 KHz to 999.9995 MHz Continuous frequency coverage • Transmit protection, up to 100 watts • CTS tone encoder, 1 KHz and external modulation

MINI KITS—EASY TO ASSEMBLE—FUN TO USE

TONE DECODER
A complete tone decoder on a single PC board. Features: 400-5000 Hz adjustable range via 20 turn pot, voltage regulation, 567 IC. Useful for touch-tone burst detection, FSK, etc. Can also be used as a stable tone encoder. Runs on 5 to 12 volts.
Complete kit, TD-1 **$5.95**

40 WATT 2 mtr PWR AMP
Simple Class C power amp features 8 times power gain 1 W in for 8 out, 2 W in for 15 out, 5 W in for 40 W out. Max output of 50 W, incredible value, complete with all parts, less case and T-R relay.
PA-1, 40 W pwr amp kit **$27.95**
TR-1, RF sensed T-R relay kit **6.95**

COLOR ORGAN
See music come alive! 3 different lights flicker with music. One light each for, high, mid-range and lows. Each individually adjustable and drives up to 300 W, runs on 110VAC.
ML-1 Kit, **$8.95**

VOICE ACTIVATED SWITCH
Voice activated switch kit provides switched output with current capability up to 100 mA. Can drive relays, lights, LED or even a tape recorder motor. Runs on 9 VDC.
VS-1 KIT **$6.95**

VIDEO MODULATOR
Converts any TV to video monitor. Super stable, tunable over ch 4-6. Runs on 5-15V accepts std. video signal. Best unit on the market! Complete kit, JM-7 **$12.95**

LED BLINKY KIT
Alternately flashes 2 jumbo LEDs. Use for name badges, buttons, warning panel lights. Runs on 3 to 15 volts.
BL-1 Kit, **$3.95**

MAD BLASTER
Produces LOUD ear shattering and attention getting siren like sound. Can supply up to 15 watts of obnoxious audio. Runs on 6-15 VDC
MB-1 Kit **$4.95**

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Provides the basic parts and PC board required to provide a source of precision timing and pulse generation. Uses 555 timer IC and includes a range of parts for most timing needs.
UT-5 Kit **$5.95**

WHISPER LIGHT
An interesting kit, small mike picks up sounds and converts them to light. The louder the sound, the brighter the light. Includes mike, controls up to 300 W, runs on 110 VAC.
WL-1 Kit **$6.95**

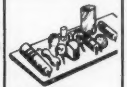
FM WIRELESS MIKE
Transmits up to 300' to any FM broadcast radio, uses any type of mike. Runs on 3 to 9V. Type FM-2 has added sensitive mike preamp stage.
FM-1 Kit **$5.95**
FM-2 Kit **$7.95**

SIREN
Produces upward and downward wail. 5 W peak audio output, runs on 3-15 volts, uses 3-45 ohm speaker.
Complete kit, SM-3 **$3.95**

SUPER SLEUTH
A super sensitive amplifier which will pick up a pin drop at 15 feet! Great for monitoring baby's room or as general purpose amplifier. Full 2W rms output, runs on 6 to 15 volts, uses 8-45 ohm speaker.
BN-9 Kit **$5.95**

60 Hz TIME BASE
Runs on 5-15 VDC.
Low current (25ma)
1 min/month accuracy
TB-6 Kit **$5.50**
TB-6 Assy. **$9.95**

TELEPHONE TRANSMITTER
Low cost with professional performance. Features include; self phone line powered, tunable from 76 to 100 MHz, polarity antisensitive, compact size (½" x 1¼"), easily installs anywhere on the phone line or inside the instrument itself.
PB-1 KIT **$14.95**



FM RECEIVER
For built-in applications or hobby experimentation. Full fledged superhetrodyne receiver, microvolt sensitivity, 10.7 MHz IF, Integrated Circuit detector, 50 mw audio amplifier, 9V external power source, operation on standard FM broadcast band as well as large portions on each side, compact (6" square), for bug detection or reception
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FM MINI MIKE
A super high performance FM wireless mike kit! Transmits a stable signal up to 300 yards with exceptional audio quality by means of its built in electret mike. Kit includes case, mike, on-off switch, antenna, battery and super instructions. This is the finest unit available.
FM-3 Kit **$16.95**
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NEW

MICROWAVE INTRUSION ALARM
A real microwave doppler sensor that will detect a human as far as 10 feet away. Operates on 1.3 GHz and is not affected by heat, light or vibrations. Drives up to 100 ma output, normally open or closed, runs on 12 VDC.
Complete kit, MD-3 **$16.95**

NEW

SPEECH SCRAMBLER
Communicate in total privacy over your telephone or radio. This scrambler kit features full duplex operation using frequency inversion. Runs on a 9 volt battery. Both mike and line or speaker output/inputs. Easy to connect to any radio—telephone use requires no direct connection! Easy to build, uses IC DBM circuitry . Can also be used to descramble most com. scramblers.
Complete kit, SS-7 **$29.95**
Case kit, CSS-7 **12.95**

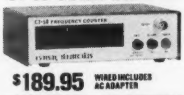
CT-70 7 DIGIT 525 MHz

$139.95 WIRED, INCLUDES AC ADAPTER

CT-90 9 DIGIT 600 MHz

$169.95 WIRED INCLUDES AC ADAPTER

CT-50 8 DIGIT 600 MHz



$189.95 WIRED INCLUDES AC ADAPTER

CT-125 9 DIGIT 1.2 GHz

$189.95 WIRED INCLUDES AC ADAPTER

FREQUENCY COUNTERS

Ramsey Electronics has been manufacturing electronic test gear for over 10 years and is recognized for its lab quality products at breakthrough prices. All of our counters carry a full one year warranty on parts and labor. We take great pride in being the largest manufacturer of low cost counters in the entire USA. Compare specifications. Our counters are full featured, from audio to UHF, with FET high impedance input, proper wave shaping circuitry and durable high quality epoxy glass, plated-thru PC Board construction. All units are 100% manufactured in the USA.

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Telescopic whip antenna—BNC plug	$ 8.95
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Low pass probe, audio use	16.95
Direct probe, general purpose use	13.95
Tilt bail for CT-70, 90 & 125	3.95
Nicad pack for CT-70, 90 & 125	8.95

MODEL	FREQ RANGE	SENSITIVITY	ACCURACY	DIGITS	RESOLUTION	PRICE
CT-70	20 Hz-550 MHz	< 50 mv To 150 MHz	1 PPM	7	1 Hz, 10Hz, 100Hz	139.95
CT-90	10 Hz-600 MHz	< 10mv To 150 MHz < 150mv To 600 Mhz	1 PPM	9	0.1Hz, 10Hz, 100 Hz	169.95
CT-50	5 Hz-600 MHz	LESS THAN 25 mv	1 PPM	8	1Hz, 10Hz	189.95
CT-125	10 Hz-1.25 GHz	< 25mv @ 50 MHz < 15mv @ 500 MHz < 100mv @ 800 MHz	1 PPM	9	0.1Hz, 1Hz, 10Hz	189.95
CT-90 WITH OV-1 OPTION	10 Hz-600 MHz	< 10mv To 150 MHz < 150mv To 600 MHz	0.1 PPM	9	0.1Hz, 1Hz, 10Hz	229.90

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TERMS: • satisfaction guaranteed • examine for 10 days; if not pleased, return in original form for refund • add 6% for shipping and insurance for a maximum of $10.00 • foreign add 15% for surface mail • COD add $2.75 (COD in USA only) • orders under $20.00 add $1.50 • NY residents add 7% sales tax • 90 days parts warranty on all kits • 1 year parts & labor warranty on all wired units.

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CIRCLE 34 ON READER SERVICE CARD

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The VCS-2100, uses a combination of VOX control from telephone line audio, and sampling of receiver noise, to achieve the optimum control method for a simplex interconnect. No sampling interruptions occur during normal conversation. Turn-a-round beeps make operation very smooth and easy.

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CIRCLE 100 ON READER SERVICE CARD

has interestingly vanished. However, the IF shift seems to work quite differently from any of the former ICOM rigs I have owned. It is quite effective in shifting the IF passband to completely eliminate an interfering signal. Could it be that when ICOM eliminated the PSB/IF combination, they rethought the design of the IF shift function?

Why Not Two AGC Functions?

ICOM has continued its tradition of providing a selectable receiver AGC, automatic gain control, that is either off, fast release, or slow release. The AGC circuit either takes "hold" or attacks very quickly. But the decay speed is variable; this means that, since this circuit actually reduces the receiver's overall gain in the presence of strong signals in its passband, a weaker background signal may not be easily detected. Not since the IC-740 have I seen a continuously variable AGC until recently on the IC-781. Why, with today's technology, don't manufacturers provide two AGC functions on a single concentric control—one to vary the AGC attack time constant and one for the AGC release time constant?

ICOM has also included a notch filter on the IC-765 very much like the one on its predecessor, the IC-761. The notch filter depth on my rig can take a CW signal from S-9+30 down to about S5. This is pretty good, except that the notch is so narrow it is very easy to miss the notch "window" when setting the notch frequency control. It's too bad ICOM did not include some kind of notch frequency automatic tracking and lockup, as the Datong FL-3 Multimode Filter does.

The "select memory" scan is a new feature. Press the SELECT button in the upper right corner to select the memories you wish to scan in the memory recall mode.

Under the Covers

The interior of the IC-765 is spacious. All modules either have their own casing or they are covered by metal panels and separators, providing reasonably good shielding, which in turn helps reduce the coupling of stray noise among the various transceiver modules. The CPU and PLL modules are completely isolated in a metal enclosure under the power supply, just under the top cover.

ICOM has liberally used coaxial cabling between modules, reminiscent of some of the more expensive commercial and military design techniques. Of course, this helps reduce receiver noise and susceptibility to personal computer hash. This is an improvement over the interference my PC used to generate on an IC-751A I owned.

The IC-765 in Action

There is not too much I can say about the IC-765's transmitter other than it yielded the specified 100 watts minimum on all bands. The transmitted SSB envelope pattern appeared identical and quite asymmetric on both sidebands. The SSB Christmas trees looked good.

When I switched the speech processor on, the rig did not flat-top on voice peaks, not even when both the ALC and COMP were intentionally misadjusted.

I also checked my IC-765 under high VSWR conditions and found that the transmitter quickly folded back output power after a sustained mismatch above 3 to 1. Under these conditions the transmitter's cooling fan worked almost continuously. Under normal SSB transmission conditions and proper load to the transmitter, the fan hardly ever came on.

The newly added transmit microphone tone control seems to work on my rig. However I have not really figured out how to optimally set this control. Remember, transmitted audio quality is not only a function of your rig's design and audio circuit, but also the speaker's voice and the listener's ears. With most hams getting older, and maybe more deaf, I have to wonder about the benefit of this control and microphones like ICOM's SM-10!

Although my IC-765 did pick up some hash, it was less than S1 on 10 meters.

The IC-765's control program is contained in a single EPROM which in my rig was socketed! I wonder if ICOM is going to offer EPROM upgrades in functionality?

Dust?

One continued irritation I have had with the IC-765 is dust. Yes, dust! Whatever the reason, small dust particles repeatedly lodge themselves behind the large clear plastic digital display cover. ICOM provided no way to dust behind the cover, nor have they sealed it from dust. I have had to take off the entire front panel twice to remove the nagging dust particles.

My IC-765 was not without a minor problem. I got the rig in March and ran it almost every waking hour until about June. Then I discovered that on initial powerup, the PLL wasn't locking up on the lower 200 kHz of every band segment. Like most intermittent problems, it went away once the rig had been powered up for more than a minute. I called ICOM service in Washington state immediately. They eagerly helped me perform a few basic checks on the rig and concluded that they had to see it.

I shipped it off to ICOM, and within a few days they had looked at it. Apparently, the DDS unit needed a slight adjustment. I guess minor adjustments are not uncommon on first-production run rigs. I also learned that when ICOM America first got my rig from Japan, they subjected it to a thorough checkout and burn-in for at least 72 hours before delivering it to me in March. I guess ICOM is being extra cautious on first-production run deliveries of equipment.

Without a Glitch

At the time of writing this review, the IC-765 has performed flawlessly for months. In my opinion, it's one of the best HF rigs ICOM has ever made. It may be less expensive than the IC-781, yet slightly better in certain areas. This in my estimation makes the IC-765 a good buy for the money! ▪

You may contact Michael Cobuccio WA1EYP at M.K.E.J. Associates Inc., 16 Westminster Lane, Merrimack NH 03054.

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MODEL PT2500A LINEAR AMPLIFIER

The Barker & Williamson PT2500A Linear Amplifier is a completely self-contained table-top unit designed for continuous SSB, CW, RTTY, AM or ATV operation. Intended for coverage of all amateur bands between 1.8 MHz and 21 MHz, it can be readily modified for frequencies outside the amateur bands for commercial or military application. Two type 3-500z glass envelope triodes provide reliability and rapid turn-on time.

FEATURES INCLUDE:
- Full 1500 watt output
- Pi-network input for maximum drive
- Pressurized plenum cooling system
- DC antenna relay for hum-free operation
- Illuminated SWR and power meters
- Vernier tuning for accurate settings
- PI-L output for greater harmonic attenuation

Ruggedly constructed of proven design, this amplifier reflects the manufacturer's critical attention to details – such as the silver-plated tank coil for maximum efficiency. Cathode zener fuse and internal/external cooling are among the protective and safety devices employed. Input and output impedances are 50 ohms.

Dimensions: 17" wide x 19" deep x 8"½ high
Weight: 80 lbs. (shipped in 3 cartons to meet UPS requirements)

Price: $2175.00 FOB factory. Price includes one year limited warranty.

Call or write factory for complete specifications.

MODEL VS1500A ANTENNA COUPLER

The Barker & Williamson VS1500A antenna coupler is designed to match virtually any receiver, transmitter or transceiver in the 160 to 10 meter range (1.8 to 30 MHz) with up to 1500 watts RF power to almost any antenna, including dipoles, inverted vees, verticals, mobile whips, beams, random wires and others, fed by coax cable, balanced lines or a single wire. A 1:4 balun is built in for connection to balanced lines.

FEATURES INCLUDE:
- Series parallel capacitor connection for greater harmonic attenuation.
- In-circuit wattmeter for continuous monitoring.
- Vernier tuning for easy adjustment.

Front panel switching allows rapid selection of antennas, or to an external dummy load, or permits bypassing the tuner.

Dimension (Approx.): 11" wide x 13" deep x 6" high
Weight: 6½ lbs.
Price: $499.00 FOB Factory. Fully warranted for one year.

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CIRCLE 53 ON READER SERVICE CARD

73 Review *by Bryan Hastings NS1B*

Alinco DR-570T 2m/70cm Mobile Transceiver

Look Ma, no eyes!

Alinco Electronics Inc.
20705 S. Western Ave., Suite 104
Torrance CA 90501
Tel. (213) 618-8616
Price Class: $750

A 440 MHz/2m mobile rig is becoming an increasingly useful travel companion. The 2 meter band nowadays is very crowded, especially in metropolitan areas, and more and more repeaters are sprouting up on the higher frequency bands, especially on 1.25m and 70cm. Even in rural southwestern New Hampshire, I can access three 440 MHz machines, and as many on 2m, during my half hour commute between work and home.

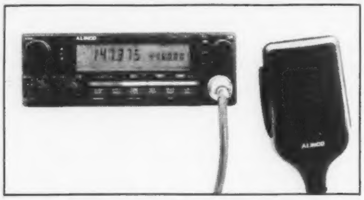
Yes, there are more hams who operate mobile than ever before, and the push is on to make mobile operation ever easier and safer. As I found out over several months' use, the Alinco DR-570T is right up there with the best of them. Read on to find out why!

Specifications

The manual claims a power output on the high setting of 45W and 35W for VHF and UHF, respectively, and 5W for each on low. Tests at *73* HQ showed that the 570 met or exceeded these specs. The high power levels are about as high as you'll find on any mobile rig on the market today.

Bear in mind that the maxim, "the more power out, the merrier," doesn't always hold true for repeater operation. The ideal situation is to be in reciprocity with a repeater, where both the mobile rig and the repeater begin to hear one another at roughly the same time as the mobile station approaches the repeater. I found, though, that the high power out/receiver sensitivity balance on the 570 is very good. Operating while approaching, and receding from, ten repeater systems in this area, there was reciprocity in all cases.

On 70cm, the 570 receives only in the amateur allocation (440–450 MHz), but on 2m it receives between 130–169.995 MHz. In many rigs, receiver sensitivity is optimized for the ham band, and drops off sharply out of band. This didn't appear to be the case with the 570—at least up-frequency from the 2m ham allocation—judging by the plethora of weather service stations and public service channels I received on 162–163 MHz and 150–160 MHz (recall that I do not live in a metropolitan area).



Front panel of the Alinco 570T.

Features and Operation

The 570 has nearly all the features that have become *de rigueur* for mobile rigs: full cross-band duplex; memory, programmed, and open channel scan; tone encode; CTCSS (tone encode/decode) with 37 selectable tones; standard (±600 kHz for 2m and ±5 MHz for 70cm) and non-standard offsets; priority and call channel; and offset reverse.

Full duplex operation—also known as "telephone style" operation since you can both hear and talk at the same time—is one of my favorites. Hopefully, we will soon see more full duplex repeater sites springing up. One of the challenges in ham radio is to make our communications more effective and meaningful. Although there are times where being in either only the talk or listen mode is best, full duplex really helps an animated and creative discussion flow.

For some reason, some manufacturers don't seem to pay enough attention to heat-sinking the finals to support lengthy key-down periods. I was first alerted to this while using another name's dual bander in full duplex, and the smell of melting vinyl wafted from the front passenger seat (on which the rig sat) after about five minutes. One of Alinco's predecessors, the 24T, quickly became too hot to touch when in full duplex.

Alinco addressed this problem in the 570—the heat-sink fins have nearly three times the surface area of those on the 24T. It remains very warm, but still touchable, after 10 minutes of key-down.

The scan modes worked as advertised. The VFO scan is really just a programmed scan with the band edges as the scan boundaries (in memories 7 and 8). If the programmed scan is set within the band edges, and is activated, the rig does NOT jump to within the boundaries before starting to scan, but tunes until it gets within that range. It scans in one direction only, determined by the direction the VFO was last tuned (either up- or down-frequency), rather than oscillating between the two boundaries.

Memory functions are as simple as you can get with a rig that doesn't have direct frequency entry. To enter a memory into a cell takes four keystrokes and VFO and memory tuning.

One of the local 440 MHz machines I regularly check into uses tone access. The tone encode worked as advertised on the rig. You see the actual sub audible tone frequency (e.g., 88.5 Hz) when in tone set mode, instead of a channel number some rigs show.

The non-standard offset is a little unusual—it works by putting the transmit frequency in memory 9, and tuning the VFO for the receive frequency. There is selectable VFO lock, and I discovered that the VFO automatically locks during transmit.

Manufacturer's Specifications

General	
VHF	Receive: 130–169.95 MHz/Transmit: 144–147.995 MHz
UHF	Receive/Transmit: 440–449.95 MHz
Mode	F3 (FM)
Tune steps	5, 10, 12.5, 20, and 25 kHz
Antenna Z	50Ω unbalanced, female UHF connector
Power	13.8V DC
Current Drain	Receive (squelched) doesn't exceed 500 mA (13.8V DC)
Transmit	VHF High/Low Power8A/4A UHF High/Low Power7A/4A
Dimensions	5⅞"W x 2"H x 8½"D
Weight	3.74 lbs.
Transmitter	
Output Power	VHF High/Low 45W/5W UHF High/Low 35W/5W
Modulation	Variable Reactance FM (Phase Modulation)
Deviation	±5 kHz maximum
Spurious Emissions	More than 60 dB below carrier
Microphone	Electret condenser
Receiver	
Receiving system	Superheterodyne, dual conversion
IFs	VHF 1st 10.7 MHz, 2nd 455 kHz UHF 1st 30.825 MHz, 2nd 455 kHz
Sensitivity	0.30µV for 12 dB SINAD
Selectivity	More than ±6 kHz at 6 −dB Less than ±12 kHz at −60dB
Audio Power	1.5–2.5W
Speaker Z	8Ω

continued on p. 29

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$12,000,000 Scanner Sale

Uniden Corporation of America has purchased the consumer products line of Regency Electronics Inc. for $12,000,000. To celebrate this purchase, we're having our largest scanner sale in history! Use the coupon in this ad for big savings. Hurry...offer ends March 31, 1990.

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Get special savings on the scanners listed in this coupon. This coupon must be included with your prepaid order. Credit cards, personal checks and quantity discounts are excluded from this offer. Offer valid only on prepaid orders mailed directly to Communications Electronics Inc., P.O. Box 1045 – Dept. UNI3, Ann Arbor, Michigan 48106-1045 U.S.A. Coupon expires March 31, 1990. Coupon may not be used in conjunction with any other offer from CEI. Coupon may be photocopied. Add $12.00 for shipping in the continental U.S.A.

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Bearcat 200XLT-T2	**$229.95**
Bearcat 100XLT-T	**$184.95**
Bearcat 800XLT-T2	**$229.95**
Uniden HR2510-T	**$229.95**
Uniden HR2600-T	**$274.95**
Uniden PRO500D-T2	**$29.95**

★★★★VALUABLE COUPON★★★★

Bearcat® 760XLT-T

List price $499.95/**CE price $244.95/SPECIAL**

12-Band, 100 Channel • Crystalless • AC/DC

Frequency range: 29-54, 118-174, 406-512, 806-956 MHz. Excludes 823.9875-849.0125 and 868.9875-894.0125 MHz.

The *Bearcat* 760XLT has 100 programmable channels organized as five channel banks for easy use, and 12 bands of coverage including the 800 MHz. band. The *Bearcat* 760XLT mounts neatly under the dash and connects directly to fuse block or battery. The unit also has an AC adaptor, flip down stand and telescopic antenna for desk top use. 6-5/16" W x 1⅝" H x 7⅜" D. Model **BC 590XLT-T** is a similar version without the 800 MHz. band for only $194.95. Order your scanner from CEI today.

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Regency® RH256B-T

List price $799.95/**CE price $299.95/SPECIAL**

16 Channel • 25 Watt Transceiver • Priority

The *Regency* RH256B is a sixteen-channel VHF land mobile transceiver designed to cover any frequency between 150 to 162 MHz. Since this radio is synthesized, no expensive crystals are needed to store up to 16 frequencies without battery backup. All radios come with CTCSS tone and scanning capabilities. A monitor and night/day switch is also standard. This transceiver even has a priority function. The RH256 makes an ideal radio for any police or fire department volunteer because of its low cost and high performance. A *60 Watt* VHF 150-162 MHz. version called the **RH606B-T** is available for $429.95. A UHF 15 watt, 16 channel version of this radio called the **RU156B-T** is also available and covers 450-482 MHz. but the cost is $454.95.

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Bearcat® 200XLT-T2

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12-Band, 200 Channel • 800 MHz. Handheld
Search • Limit • Hold • Priority • Lockout

Frequency range: 29-54, 118-174, 406-512, 806-956 MHz. Excludes 823.9875-849.0125 and 868.9875-894.0125 MHz.

The *Bearcat* 200XLT sets a new standard for handheld scanners in performance and dependability. This full featured unit has 200 programmable channels with 10 scanning banks and 12 band coverage. If you want a very similar model without the 800 MHz. band and 100 channels, order the **BC 100XLT-T** for only $189.95. Includes antenna, carrying case with belt loop, ni-cad battery pack, AC adapter and earphone. Order your scanner now.

Bearcat® 800XLT-T2

List price $549.95/**CE price $239.95/SPECIAL**

12-Band, 40 Channel • No-crystal scanner
Priority control • Search/Scan • AC/DC

Bands: 29-54, 118-174, 406-512, 806-912 MHz. Excludes 823.9875-849.0125 and 868.9875-894.0125 MHz.

The Uniden 800XLT receives 40 channels in two banks. Scans 15 channels per second. Size 9¼" x 4½" x 12½." If you do not need the 800 MHz. band, a similar model called the **BC 210XLT-T** is available for $178.95.

Bearcat® 145XL-T

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10-Band, 16 Channel • No-crystal scanner
Priority control • Weather search • AC/DC

Bands: 29-54, 136-174, 406-512 MHz.

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10 Meter Mobile Transceiver • Digital VFO
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Backlit liquid crystal display • Auto Squelch
RIT • Preprogrammed 10 KHz. Channels

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The *President* HR2510 Mobile 10 Meter Transceiver made by Uniden, has everything you need for amateur radio communications. Up to 25 Watt PEP USB/LSB and 25 Watt CW mode. Noise Blanker. PA mode. Digital VFO. Built-in S/RF/MOD/SWR meter. Channel switch on the microphone, and much more! The HR2510 lets you operate AM, FM, USB, LSB or CW. The digitally synthesized frequency control gives you maximum stability and you may choose either pre-programmed 10 KHz. channel steps, or use the built-in VFO for steps down to 100 Hz. There's also RIT (Receiver Incremental Tuning) to give you perfectly tuned signals. With receive scanning, you can scan 50 channels in any one of four band segments to find out where the action is. Order your HR2510 from CEI today.

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10 Meter Mobile Transceiver • New Features

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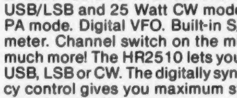

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800 MHz.
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SPECIAL!

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RRF-T Railroad frequency directory	$14.95
EEC-T Embassy & Espionage Communications	$14.95
CIE-T Covert Intelligence, Elect. Eavesdropping	$14.95
MFF-T Midwest Federal Frequency directory	$14.95
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A70-T Base station scanner antenna	$35.95
A1300-T 25 MHz.–1.3 GHz Discone antenna	$109.95
USAMM-T Mag mount VHF ant. w/ 12' cable	$39.95
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IC-781	Xcvr/Rcvr/ps/tuner/scope	6149	**5295**

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FL-52A	500 Hz CW filter (2nd IF)....	115.00	**109^{95}**
FL-53A	250 Hz CW filter (2nd IF)....	115.00	**109^{95}**
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FL-70	2.8 kHz wide SSB filter........	59.00	
RC-10	External frequency controller	49.00	

IC-735	HF transceiver/SW rcvr/mic ...	1149.00	**999^{95}**
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AT-150	Auto. antenna tuner ***(Special)***	445.00	**369^{95}**
FL-32A	500 Hz CW filter...............	69.00	
EX-243	Electronic keyer unit	64.50	
UT-30	Tone encoder	18.50	
IC-725	Ultra compact HF xcvr/SW rcvr	949.00	**829^{95}**
IC-726	10-band xcvr/6m/.5-30MHz rx	1299.00	**1129**

Other Accessories		Regular	SALE
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IC-4KL	HF 1KW out s/s amp w/ps.....	6995.00	**5995**
EX-627	HF auto. ant. selector ***(Special)***	315.00	**269^{95}**
PS-15	20A external power supply	175.00	**159^{95}**
PS-30	Systems p/s w/cord, 6-pin plug	349.00	**319^{95}**
MB	Mobile mount, 735/751A/761A....	25.99	
SP-3	External speaker	65.00	
SP-7	Small external speaker	51.99	
CR-64	High stab. ref. xtal for 751A.....	79.00	
PP-1	Speaker/patch	179.00	**164^{95}**
SM-6	Desk microphone	47.95	
SM-8	Desk mic - two cables, Scan......	89.00	
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AT-500	500W 9-band auto. ant. tuner ...	589.00	**519^{95}**
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IC-375A	25w 220 FM/SSB ***(Closeout)*** ..	1399.00	**799^{95}**
IC-475A	25w 440 FM/SSB/CW w/ps	1399.00	**1199**
IC-475H	100w 440 FM/SSB/CW.......	1599.00	**1369**
IC-575A	25w 6/10m xcvr/ps ***(Special)***	1399.00	**1129**
IC-575H	25w 100w 6/10m xcvr........	1699.00	**1469**

VHF/UHF/1.2GHz mobiles		Regular	Sale
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PS-45	Compact 8A power supply....	145.00	**134^{95}**
UT-16/Ex-388	Voice synthesizer	34.99	
SP-10	Slim-line external speaker	35.99	
IC-28A	25w 2m FM, **TTP** mic ***(Special)***	469.00	**379^{95}**
IC-28H	45w 2m FM, **TTP** mic ***(Special)***	499.00	**389^{95}**
IC-48A	25w 440-450 FM, **TTP** mic	509.00	**449^{95}**
HM-14	Extra TTP microphone........	59.00	
UT-28	Digital code squelch...........	39.50	
UT-29	Tone squelch decoder..........	39.50	
HM-16	Speaker/microphone..........	34.00	
IC-228A	25w 2m FM/TTP mic ***(Special)***	509.00	**379^{95}**
IC-228H	45w 2m FM/TTP scan ***(Special)***	539.00	**429^{95}**
IC-448A	25w 440 FM/TTP mic	599.00	**519^{95}**
UT-40	Pocket beep function..........	45.00	
IC-900A	Transceiver controller	639.00	**499^{95}**

★ ***Closeout Special . . .***
IC-900A Transceiver controller with **UX-29H** 2m/25W and **UX-39A** 220/25W band units.
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UX-19A	10m, 10w band unit.........	299.00	**269^{95}**
UX-29A	2m, 25w band unit	299.00	**269^{95}**
UX-29H	2m, 45w band unit..........	349.00	**319^{95}**
UX-39A	220MHZ, 25w band unit	349.00	**299^{95}**
UX-59A	6m, 10w band unit	349.00	**319^{95}**
UX-129A	1.2GHz 10w band unit.....	549.00	**499^{95}**
IC-901	Fiber Optic 2m/440 xcvr	1199.00	**1049**
IC-1200A	10w, 1.2GHz FM ***(Closeout)***	699.00	**599^{95}**
IC-2500A	35w, 440/1.2GHz FM mobile	999.00	**869^{95}**
IC-3210A	25w, 2m/440 FM/TTP.......	739.00	**639^{95}**
IC-2400A	45w 2m/35w 440 FM/TTP	899.00	**789^{95}**
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AHB-32	Trunk-lip mount..............	39.00	
Larsen PO-K	Roof mount	23.00	
Larsen PO-TLM	Trunk-lip mount.....	24.70	
Larsen PO-MM	Magnetic mount	28.75	
RP-1510	2m 25w repeater	1849.00	**1649**
RP-2210	220MHz 25w rptr ***(Special)*** ...	1649.00	**1399**

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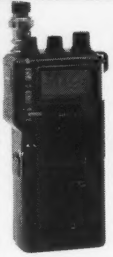

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IC-04AT	440 ***(Closeout)***	449.00	**369^{95}**
IC-2SA	2m HT	419.00	**369^{95}**
IC-2SAT	2m HT/TTP...	439.00	**389^{95}**
IC-3SAT	220 HT/TTP	449.00	**399^{95}**
IC-4SAT	440 HT/TTP	449.00	**399^{95}**
IC-2GAT	2m HT/TTP	429.00	**379^{95}**
IC-4GAT	440MHz, TTP	449.00	**389^{95}**
Special . .			
IC-32AT	2m/440 HT	629.00	**549^{95}**
IC-12AT	1w 1.2GHz FM HT/TTP ***(Special)***	473.00	**349^{95}**
IC-12GAT	1w 1.2GHz HT/batt/cgr/TTP	529.00	**469^{95}**

Aircraft band handhelds		Regular	SALE
A-2	5W PEP synth. aircraft HT..........	525.00	**479^{95}**
A-20	Synth. aircraft HT w/VOR.........	625.00	**549^{95}**

Accessories for all except micros		Regular
BP-7	425mah/13.2V Nicad Pak - use BC-35	79.00
BP-8	800mah/8.4V Nicad Pak - use BC-35...	79.00
BC-35	Drop in desk charger for all batteries	79.00
BC-16U	Wall charger for BP7/BP8.............	21.25
LC-11	Vinyl case for Dlx using BP-3	20.50
LC-14	Vinyl case for Dlx using BP-7/8	20.50
LC-02AT	Leather case for Dlx models w/BP-7/8	54.50

Accessories for IC and IC-O series		Regular
BP-2	425mah/7.2V Nicad Pak - use BC35....	49.00
BP-3	Extra Std. 250 mah/8.4V Nicad Pak	39.50
BP-4	Alkaline battery case	16.00
BP-5	425mah/10.8V Nicad Pak - use BC35	65.00
CP-1	Cig. lighter plug/cord for BP3 or Dlx	13.65
CP-10	Battery separation cable w/clip	22.50
DC-1	DC operation pak for standard models	24.50
MB-16D	Mobile mtg. bkt for all HTs............	25.99
LC-2AT	Leather case for standard models.....	54.50
HM-9	Speaker microphone........................	47.00
HS-10	Boom microphone/headset............	24.50
HS-10SA	Vox unit for HS-10 & Deluxe only	24.50
HS-10SB	PTT unit for HS-10.................	24.50

For other HT Accessories not listed please CALL

Receivers		Regular	SALE
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RC-11	Infrared remote controller	70.99	
FL-32A	500 Hz CW filter.............	69.00	
FL-63A	250 Hz CW filter (1st IF).....	59.00	
FL-44A	SSB filter (2nd IF)............	178.00	**159^{95}**
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SP-3	External speaker	65.00	
CK-70 (EX-299)	12V DC option	12.99	
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R-7000	25MHz-2GHz rcvr ***(Special)***.....	1199.00	**999^{95}**
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Alinco

continued from p. 26

I find the reverse toggle useful. I use it mainly to see if I have come into range of my contact's direct signal, so we tie up the repeater as little as possible.

Unusual Features

The first thing that struck me about the 570 was the amount of separate controls there are for each band. The LCD display shows the frequencies for both the main and subband. The only difference between the main and subband is that you transmit only on the main band; other than that you can receive on both (even simultaneously) and separately adjust the AF, squelch, and VFO. This lets you monitor both bands without pressing even a single keystroke—and if both are active at the same time, and you want to focus on the main band activity, just press the MUTE button to attenuate the subband audio by 20 dB. Press TWIN if you want to shut the subband off entirely. You have effectively two separate rigs under one cover!

The band/sub key swaps 2m and 70cm between the main and subband. Each band contains either 2m or 70cm frequencies only, at one time.

The 570T can be turned into a crossband repeater with no modification! Just take the top cover off (seven screws) and find the pushbutton behind the front panel on the left-hand side as you look at the front panel.

ABX puts the subband frequency into the main band whenever there's activity on it, and keeps it there for a few seconds after it becomes inactive. The bell function tells you of activity on a channel, even when your AF is turned all the way down.

I think the most impressive features of the 570 by far are its tactile and auditory aids, critical for mobile work since you need to keep your eyes on the road as much as possible. All 20 controls are located on the front panel, and most of the pushbutton controls are large enough to accommodate the broadest (and clumsiest) fingertips. In fact, the six dual-function pushbuttons along the bottom edge of the front panel have unique raised patterns on their surfaces which let your fingertip quickly find the right control. Nice touch!

Alinco almost went overboard with all the beeping indicators they've included. There are series of beeps to tell you when you're passing a MHz point while going up-freq, while going down-freq, while passing ½ MHz points, and while passing channels in memory. Using this with the 1 MHz rocker switch to the left of the display, you can quickly get well within ½ MHz of your desired channel without even glancing at the rig! If the beeping drives you to distraction, however, you can just shut them off with the beep toggle.

Manual

I found the rig's control setup intuitive, and so didn't consult the manual very much. If you need to, however, you'll find it modest but well organized. It is 25 photocopied pages, including pictorials of the front panel and LCD display, with numbered controls and indicators keyed to their descriptions in the first seven pages. The English text is formal in places but still very easy to understand. At this writing, Alinco is already shipping a more polished manual.

Nit-Picks

There are areas on any rig that can be improved. My suggestions for the 570 are:

Do not hard-partition the twenty memories. It's now set at 10 each for the two bands. You are much more likely to use many more memories for 2m than for 70cm.

Include standard offset directions as defaults. For example, receive channels between 147–147.375 MHz typically have a positive offset. On this rig, you have to set the offset, anyway, and it wouldn't take any more work to reset an offset for an unconventional channel pair.

Add detent and/or a sidetone for the DTMF keypad on the mike. With this pad, I always feel a little unsure when entering an autopatch number, resetting code for our repeater, etc.

In programmed scan, it would be nice if the VFO would jump to the scan area when this scan is activated. As is, at the scan rate of nearly ½ minute/MHz, it can take up to five minutes for the rig to tune to a given bounded area.

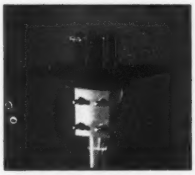
Put the transmit and receive channels for the odd offset into two memory channels, or have a selectable offset function. Tuning the receive frequency on the VFO is a bit of a hassle.

Conclusion

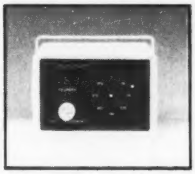
I used the 570 nearly daily for several months on both bands, and it didn't give me a whit of trouble. Audio reports were all very good to excellent. I was glad to see that Alinco zapped the design bug that caused the 24T to empty its memories every few weeks.

I recommend the Alinco DR-570T wholeheartedly. The few faults I found with it are minor. It is nearly as full-featured as you can want, and certainly one of the safest mobile rigs to operate that you will find anywhere!

108-1000 MHZ RADIO DIRECTION FINDING



- ★ Interference Location
- ★ Stuck Microphones
- ★ Cable TV Leaks
- ★ ELT Search & Rescue



New Technology (patented) converts any VHF or UHF FM receiver into a sensitive Doppler shift radio direction finder. Simply plug into receiver's antenna and external speaker jacks. Models available with computer interface, synthesized speech, fixed site or mobile - 108 MHz to 1 GHz. Call or write for details.

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P.O. Box 31819
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CIRCLE 13 ON READER SERVICE CARD

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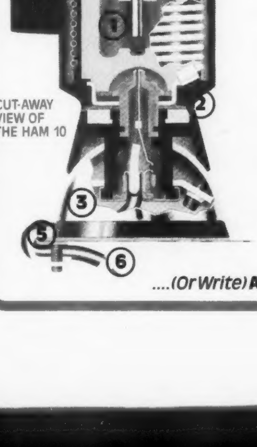
THE .....OR YOUR MONEY BACK!

HAM 10™ **TEN METER HAM ANTENNA**



CUT-AWAY VIEW OF THE HAM 10

The "Ham 10" ten meter antenna is designed and manufactured by American Antenna, makers of the world famous K40 Antenna. With a power handling capacity of 1500 watts and a band width of 1.5 mhz between 2:1 SWR points the "HAM 10" is the perfect compliment to all single-band ten meter rigs. The stainless steel base of the "HAM 10" is supplied with an adjustable trunk lip mount. Also available is an optional adaptable heavy duty magnamount.

EXCLUSIVE FEATURES:

① HANDLES UP TO 1500 WATTS!
② METALPLAS CONSTRUCTION.
③ 30° ROTATION OF BASE.
④ STAINLESS STEEL WHIP AND BASE.
⑤ MOUNTS ANYWHERE ON ANY VEHICLE!
⑥ FULLY ASSEMBLED WITH 18' of RG-58 COAX.
⑦ COMPUTER DESIGNED ISOLATION CHAMBER.

For A Free Brochure, Call:
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CIRCLE 92 ON READER SERVICE CARD

Number 12 on your Feedback card

73 Review *by C.L. Houghton WB6IGP*

Advanced Electronic Applications Inc.
PO Box C-2160
Lynnwood WA 98036-0918
(206) 775-7373
Price Class: $320

The AEA MX-6S 6 Meter SSB/CW HT

World wide hamming from a hand-held transceiver!

Six meter SSB/CW in a handheld radio? You don't run into this kind of rig very often. This arrangement, however, makes a lot of sense. Six meters is like 10m: When the band is dead, no amount of output power works for skip wave, but when the band is up, you can work the world with a watt or less!

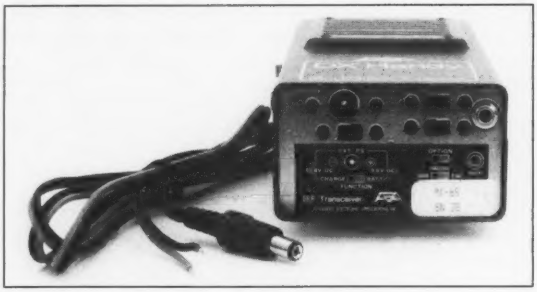


Photo A. Front and top panel of the DX Handy. This 5½" x 2½" x 1½" 6m 1 Watt SSB/CW transceiver weighs less than 2 pounds!

What It's About

The frequency coverage as supplied covers 50.1 to 50.150 MHz, and 50.200 to 50.250 MHz, using a variable crystal oscillator (VXO) giving 50 kHz of range per crystal. The first crystal covers 50.125 MHz, a common calling frequency. You select the two crystals by choosing channel "A" or "B" on the radio's top panel.

Rotating the VXO control knob adjusts frequency (top panel, upper right). A 180 degree rotation of the knob gives a 50 kHz adjustment per channel crystal. The dial scale is in 5 kHz increments. This is more than adequate as most of the six meter SSB DX use is in the first 50 kHz or so of the band. Only during periods of very high activity would you want to use another frequency, possibly setting the channel "B" crystal 50 kHz lower in frequency to give full 100 kHz coverage from 50.1 to 50.2 MHz.

The VXO knob is small, and the range is wide when you consider that you get only ½ revolution sweep, so getting right on frequency takes the fine touch. Fortunately, there's a Receive Incremental Tuning (RIT) control (top panel, upper left) that covers only 1/10 that range (5 kHz) range in nearly a full revolution—making it very easy for you to set the receive exactly where you want it, without changing the transmit frequency.

Operation

I used the HT on several mountaintop trips, including the ARRL 10 GHz contest. The contacts that I made were all Southern California ones, due to poor propagation on 6 meters.

All the feedback on the DX Handy I received was very good, especially reports on the audio quality. There was little distortion; my voice characteristics were still very recognizable on SSB. On receive I had no trouble copying weak signals, due to this unit's high sensitivity. Also, the radio was not troubled with overloading or crossmod interference when operating close to several very high-power TV and FM transmitting stations. At the test bench with the antenna removed from the DX Handy, I found no birdies whatsoever.

Internal Data

The MX-6S is powered by 6 internal dry "AA" batteries, with an additional spacer for NiCd battery operation. The 6 dry batteries total 9 volts with the spacer in place. However, when using NiCd batteries the spacer is removed and an extra or seventh cell (NiCd) is put into operation. This seventh NiCd cell brings the NiCd pack voltage up to 9.1 volts. An additional good feature is that the cells are all individual cells and not a full pack, allowing the user to make up an easy-to-repair battery system of dry or NiCd batteries.

Per the manufacturer's recommendation, the radio must not be operated from a 12 volt power source. This will damage the radio and void the warranty. With a 12 volt source, use a simple voltage regulator to supply a maximum of 9.5 volts.

RIT
VOL
NB
OFF
SP
MIC
MX-6S
SEND
6m SSB/CW TRANSCEIVER

Photo B. Bottom panel of the DX Handy.

[Ed. note . . . Those interested in going mobile with the DX Handy should consider buying the Radio Shack Archer Universal DC Auto Adapter (#270-1560, $11.95). This adapter plugs into the cigarette lighter jack and has five output voltage choices, including 9 VDC, and six easily-swapped power connectors, including the one that mates with the DX Handy power connector.

The adapter is rated to 300 mA at 9 VDC, putting it well within range for using the DX Handy on receive (RX rated current drain: 70 mA). The rig's current drain on transmit is rated at 400 mA, 100 mA beyond the adapter's rating at 9 VDC. I enjoyed a 45-minute contact with Bob W1BDC with the Handy, however, including several transmissions exceeding five minutes, with no troubles. If you plan to do a lot of transmitting with this supply, however, it wouldn't hurt to keep a supply of 1A fuses at hand . . . .de NS1B]

The MX-6S has good frequency stability because of the crystal VXO and its varactor-controlled adjust circuitry (RIT). I did find that setting the frequency was somewhat less than accurate because the antenna was in the way of a direct observation. The dial calibration is very close to the antenna BNC connector. When the whip antenna was in use there was a slight parallax problem, but this situation doesn't cause much difficulty during normal operation.

Antenna

The supplied long whip (4′4″) antenna was very effective. To be sure, an antenna close to ¼λ long at 6m can be unwieldy! For me, however, the gain/convenience trade-off is well worth it, since I would use this rig to spot band openings, and then head home to the base station when an opening occurs.

You can, however, further improve the field operation. A QSO with Bill KB6MCU on 6m SSB gave me a great idea: Use a small portable camera tripod as the base or counterpoise part of the whip antenna, mount the whip on the top of the camera tripod, and connect the radio with a short section of coaxial cable for portable operation. I tried it with a lightweight camera tripod and the perform-

Continued on page 65

INTRODUCING OUR NEW COMPUTER-CONTROLLED

REP-200 REPEATER

If you always thought a computer-controlled repeater had to be expensive, LOOK AGAIN! You could easily spend this much just for a controller.

As always, Hamtronics strives to give *superb performance* at *modest cost!* In this case, a premium repeater with versatile computer control, autopatch, and many dtmf control features at *less than many charge for a bare-bones repeater!*

We don't skimp on rf modules, either! Check the features on R144 Receiver, for instance. GaAs FET front-end, helical resonators, sharp crystal filters, hysteresis squelch.

We completely re-thought the whole idea of what a repeater should be, to give the *best features* at the *lowest cost.*

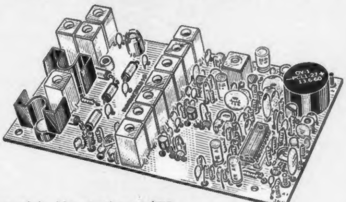
ONLY $1295!

hamtronics
REP-200 REPEATER
SQUELCH
MONITOR VOLUME

- Available for the 10M, 6M, 2M, 220MHz, 440MHz, 902MHz ham bands. ***FCC type accepted** models also available for vhf and uhf commercial bands.*
- **Rugged exciter and PA**, designed for continuous duty.
- Power output 15-18W (25W option) on 2M or hi-band; 15W on 220MHz; 10W on uhf or 902MHz.
- Accessory add-on PA's available with **power levels up to 100W**.
- **Five courtesy beep types**, including a pleasant multi-tone sequence.
- **AUTOPATCH**: either **open or closed** access, **toll-call restrict**, auto-disconnect.
- **Reverse Autopatch**, two types: auto-answer or ring tone on the air.
- **DTMF CONTROL**: over 45 functions can be controlled by touch-tone. Separate 4-digit control code for each function, plus extra **4-digit owner password**.
- **Owner can inhibit** autopatch or repeater, enable either open- or closed-access for repeater or autopatch, and enable toll calls, reverse patch, kerchunk filter, site alarm, aux rcvr, and other options, including two auxiliary external circuits.
- The cwid message, dtmf command codes, and owner-specified default parameters for cor and cwid timers and tones are burned into the eprom at the factory.
- Cw speed and tone, courtesy beep and tail timers, and courtesy beep type **can all be changed at any time** by owner-password-protected dtmf commands.
- Many **built-in diagnostic** & testing functions using microprocessor.
- Color coded led's **indicate status** of all major functions.
- **Welded partitions** for exciter, pa, receiver, and controller. PEM nuts for covers.
- 3-1/2 inch aluminum rack panel, finished in eggshell white and black.
- **Auxiliary receiver input** for independent control or **cross linking repeaters**.

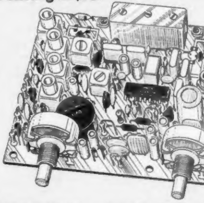
There are many other features, too numerous to mention. Request catalog for full details.

HIGH PERFORMANCE XMTRS & RCVRS FOR REPEATERS, AF & DIGITAL LINKS, TELEMETRY, ETC.



FM EXCITERS: kits $99, w/t $169. 2W continuous duty. TCXO & xtal oven options available. *FCC type accepted for com'l uhf & hi bands.*

- **TA51** for 10M, 6M, 2M, 150-174, 220MHz.
- **TA451** for uhf.
- **TA901** for 902-928MHz, 0.5W out (w/t only, $169).
- **VHF & UHF AMPLIFIERS.** For fm, ssb, atv. Output from 10W to 100W. Several models, kits starting at $79.



FM RECEIVERS: kits $139, w/t $189.

- **R144/R220 FM RECEIVERS** for 2M, 150-174, or 220MHz. **GaAs FET** front end, 0.15uV sensitivity! Both crystal & ceramic if filters plus **helical resonator** front end for exceptional selectivity: >100dB at ±12kHz (best available anywhere!) Flutter-proof hysteresis squelch; afc tracks drift.
- **R451 UHF FM RCVR,** similar to above
- **R901 902-928MHz FM RCVR.** Triple-conversion, GaAs FET front end.
- **R76 ECONOMY FM RCVR** for 10M, 6M, 2M, 220MHz, w/o helical res. or afc. Kits $129.
- **Weather satellite & AM aircraft rcvrs** also available.

If you prefer a plain-vanilla or kit repeater, you couldn't find a better value than our original

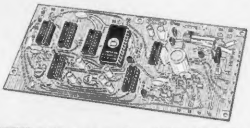
REP-100 REPEATER

Same fine rf modules as REP-200 but with COR-4 Controller. Can add autopatch, dtmf decoder, CTCSS, either now or later. **Kit only $675, w/t $975.**

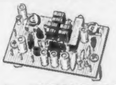
ACCESSORIES

COR-3 REPEATER CONTROLLER kit. Features adjustable tail & time-out timers, solid-state relay, courtesy beep, and local speaker amplifier $49

CWID kit. Diode programmed any time in the field, adjustable tone, speed, and timer, to go with COR-3 .... $59

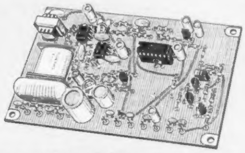


***NEW* COR-4** kit. Complete COR and CWID all on one board for easy construction. CMOS logic for low power consumption. Many new features. EPROM programmed; specify call .. $99



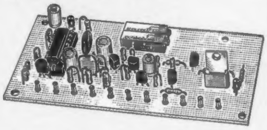
***NEW* TD-3 SUBAUDIBLE TONE DECODER/ENCODER** kit. Adjustable for any tone. Designed **especially for repeaters,** with remote control activate/deactivate provisions $24

TD-2 TOUCH-TONE DECODER/CONTROLLER kit. Full 16 digits, with toll-call restrictor, programmable. Can turn 5 functions on/off. Great for selective calling, too! $79



AP-3 AUTOPATCH kit. Use with above for repeater autopatch. Reverse patch & phone line remote control are std . $79

AP-2 SIMPLEX AUTOPATCH Timing Board kit. Use with above for simplex operation using a transceiver $39



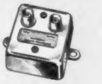
MO-202 FSK DATA MODULATOR kit. Run up to 1200 baud digital signals through any fm transmitter with full handshakes. Radio link computers, telemetry gear, etc. $39

DE-202 FSK DEMODULATOR kit. For receive end of link. $39

9600 BAUD DIGITAL RF LINKS. Low-**cost** packet networking system, consisting of new MO-96 Modem and special versions of our 220 or 450 mHz FM Transmitters and Receivers. Interface directly with most TNC's. Fast, diode-switched PA's output 15 or 50W. *Call for more info on the right system for your application!*

GaAs FET PREAMPS

at a fraction of the cost of comparable units!



LNG-(*)

***ONLY* $59**
wired/tested

FEATURES:

- **Very low noise:** 0.7dB vhf, 0.8dB uhf
- **High gain:** 13-20dB, depends on freq
- **Wide dynamic range** - resist overload
- **Stable:** low-feedback dual-gate FET

**Specify tuning range: 26-30, 46-56, 137-150, 150-172, 210-230, 400-470, or 800-960 MHz.*

LNW-(*)

MINIATURE GaAs FET PREAMP

***ONLY* $24/kit, $39 wired/tested**

- GaAs FET Preamp similar to LNG, except designed for **low cost & small size**. Only 5/8"W x 1-5/8"L x 3/4"H. Easily mounts in many radios.

**Specify tuning range: 25-35, 35-55, 55-90, 90-120, 120-150, 150-200, 200-270, or 400-500 MHz.*

LNS-(*)

IN-LINE PREAMP

***ONLY* $79/kit, $99 wired/tested**

- GaAs FET Preamp with features similar to LNG series, except **automatically switches out of line during transmit.** Use with base or mobile transceivers up to 25W. Tower mounting brackets incl.

**Specify tuning range: 120-175, 200-240, or 400-500 MHz.*

HELICAL RESONATOR PREAMPS

Preamps with 3 or 4 section helical resonators **reduce intermod & cross-band interference** in critical applications. **MODEL HRA-(*)**, $49 vhf, $94 uhf.

**Specify tuning range: 142-150, 150-162, 162-174, 213-233, 420-450, 450-470.*

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RECEIVING CONVERTER

RECEIVING CONVERTERS

Low noise converters to **receive vhf and uhf bands on a 10M receiver**. Choice of kit with case & BNC jacks, kit with pcb only, or w/t unit in a case. Other models available for other in/out ranges & atv. *Request catalog for complete listings.*

VHF input ranges avail: 136-138, 144-146, 145-147, 146-148, 220-222, 222-224; kit less case $39, kit w/case $59, w/t in case $89.

UHF input ranges avail: 432-434, 435-437; kit less case $49, kit w/case $69, w/t in case $99.

902-928 MHz converts down to 422-448 or 430-450 range. Same price as uhf.

TRANSMITTING CONVERTERS

XV2 for vhf and XV4 for uhf. Models to convert 10M ssb, cw, fm, etc. to 6M, 2M, 220, 432, 435, and for atv. 1W output. **Kit only $79.** PA's up to 45W available. *Request catalog for complete listings.*

- **For complete info, call or write for FREE 40-page catalog.** Send $2 for overseas air mail. For casual interest, check reader service; allow 3-4 weeks.
- **Order by mail, fax, or phone** (answering machine off hrs).
- **Min. $3 S&H charge** for first pound plus add'l weight & ins.
- **Use VISA, Mastercard, check, or UPS C.O.D. ($3 fee).**

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CIRCLE 57 ON READER SERVICE CARD

73 Review *by William Waters III N7IPY*

Ultra Comshack 64

Engineering Consulting
583 Candlewood St.
Brea, CA. 92621
Tel. (714) 671-2009
Price Class: $350, plus options

Remotely control your ham shack station from your HT.

Have you ever thought of owning your own repeater or operating your own remote base system? Have you been late for a schedule because you were unable to get to your station on time? Or just wanted to operate DX while sitting in the shade of a big tree in the backyard? If you answer yes to any of these questions, read on!

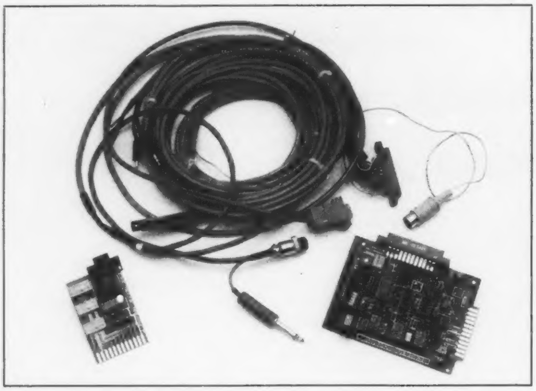


Photo A. The essential hardware for Ultra ComShack 64. The software comes either on floppies or in a cartridge that plugs into the back of the C-64.

Photo B. The Ultra ComShack 64, with the software on the cartridge, installed in the Commodore 64. The program Main Menu is displayed on the monitor. The IC-761 is the remote HF base (not yet entered as remote #1 on the Main Menu).

Run the Shack *In Absentia*

Ultra Comshack 64, a package that allows you to remotely control your ham shack, consists of one or more small PC boards that plug into a Commodore 64/128 computer, and a program on a floppy disk or optional ROM cartridge (see photos A and B). There are four modes of operation in this system, which include: HF remote and VHF remote base, repeater controller, autopatch, and code practice. A new feature supports a packet interface.

First Glance

Initially, the box of wires, cables, and PC boards along with a 30-page *Users Manual* and a 5¼" Commodore formatted disk, was a little overwhelming. I had a chance to compare the old and new systems manuals, however, and found the new one vastly superior. The new manual is typeset; well laid out; contains additional information, including the packet feature; and has clearer diagrams.

System Needs

Along with the Ultra Comshack 64's main control board and software, you need a Commodore 64, 64C, or 128 computer, with a monitor and a floppy disk drive. Next, you need a dual-band (or separate VHF/UHF) transceiver as the base repeater or control link. The transceiver combination is used in full duplex mode, and therefore requires an antenna system that will work full duplex.

[Ed note. . . Ultra Comshack 64 does not easily interface, if at all, with the Commodore 128D, a graphically enhanced version of the C-128. In the first case, the C-128D port arrangement is different from that on the C-128 and is physically incompatible with the Ultra Comshack cards. Second, the Ultra Comshack program depends on the drive ROM configuration to run, and this chip differs from the one in the internal drive of the 128D.]

The remote bases must support a serial data communications port to allow the computer to directly control VFOs and other controls on the radio. Some of the rigs that will work include the Kenwood TS-940/440/711/811, the ICOM IC-735, and the Yaesu FT-757/767/980/727R.

The last radio you need is a dual-band handheld, such as the Yaesu 727, a dual-band mobile unit like the Kenwood 701, or any other VHF/UHF radio combination. This radio is used for all operations on the system over the base repeater. The control transceiver must have a touch-tone (DTMF) pad because all control operations on the Ultra Comshack are keyed with touch tones. Once the system is running, the software disables the computer keyboard.

Installation

With the many features the advanced controller offers, I decided to begin with a simple installation: one remote HF base and the autopatch.

All the cables, and the connector I needed for the CS64S controller board, were included. The CS64S controller plugs into the expansion port of the Commodore. A cable harness, consisting of three multiconductor cables about three feet long, terminates to a 22-pin edge connector that plugs into the CS64S to connect the rigs to the interface.

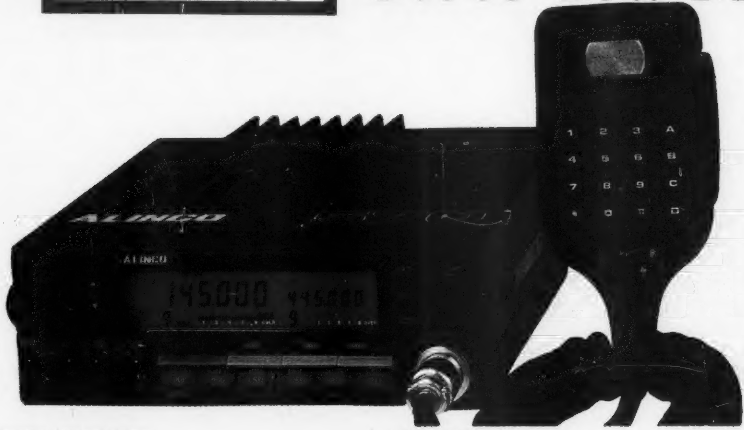
Also in the wiring harness were additional cables and connectors for various ports on the Commodore. The Users Manual has connection information for the above-mentioned HF/VHF/UHF transceivers. My original station layout required longer lengths of interconnecting cables, so after a short call to Engineering Consultants, I lengthened the cables to 10 feet each. Connecting to the HF remote base requires a mike, Push-To-Talk, headphone, and serial computer interface connections. The manual adequately covers installation.

My full duplex control link or base repeater consisted of a Kenwood 2600 2m HT for transmitting, and a TH-45AT 70cm HT for receiving. The CS64S interface requires a squelch signal from the control link receiver. After poking around inside the TH-45AT, and making a second call to Engineering Consultants, I found the signal I was looking for. The System Manual has examples of what to look for when trying to find the squelch signal, which I found useful.

After connecting the mike and PTT signals to the link transmitter (TR-2600), and the Au-

ALINCO ELECTRONICS

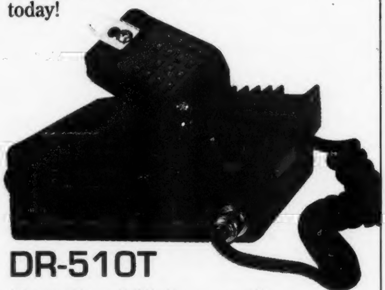
The Magnificent Six Gives You More Power



DR-570T

Set your sights for dual!

The Alinco DR-570T "Twin Bander" has dual LCD readout, volume, squelch and tuning controls. Double barrelled power with 45W on 2M and 35W on 70 cm, plus simultaneous receive on both bands or intermix with four modes of scan. The DR-570T will win the "battle" with its illuminated front function panel and LCD readout, readable in any lighting conditions. Don't let the "Tiny" DR-570T fool you! It's fast, and leaves the competition in the dust with many standard features you expect. Cross band repeat with the flick of a switch. Full duplex, 20 memory channels, call channels, 16-key DTMF Microphone, and subtones are just a few. "Reach" for the DR-570T today!



DR-510T

Best Dual Value on the Market!

The Alinco DR-510T has most of the outstanding features of it's sister the DR-570T, including 14 memory channels, cross band duplex and cross band repeat. The multi color LCD display, and simple tune control panel makes simplicity the key word. The DR-510T with 45/35 watts is the best, feature-packed dual bander on the Amateur market today. See the DR-510T along with the other Alinco "Magnificent" ones at your favorite dealer today!

DJ-500T

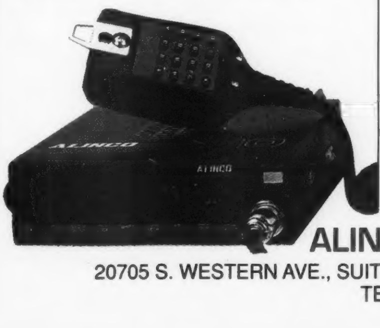
Power-Packed Dual Handi!

20 Memory channels, subtones, built-in DC to DC, 700 mah nicad battery, LCD readout with 6W on 2M and 5W on 70 cm (with optional battery) call channels, DTMF Touchtone, and direct keyboard entry, are just the few winning features of the Alinco DJ-500T Dual Band Handheld. Easy to use, and Value Priced at your Alinco Dealer.

DR-110T&R-410T

Tiny 2M Power From Alinco!

DR-110T, this 2M Alinco, enters the nineties a proven winner with the "reputation" of best value. The DR-110T packs a powerful 45W on 2M and sports all the features you expect in todays transceivers. Tuning is a snap with the multi-functioned easy-to-see keyboard, 14 memory channels, subtones, scan, multi- colored LCD readout, reverse, are a few of the many features of the DR110T. The mobile of the future — today! DR-410T available for 70 cm.



DJ-100T&DJ-200T

Best 2M Micro Value Anywhere!

The Alinco DJ-100T is "Magnificent" for its tiny size, but stands up to the competition with power and capability. 10 memory channels store offsets and subtones. Has LCD readout with call channel and reverse at your fingertips. 500 mah battery with direct DC to DC is standard. 3W on standard battery, 6W on optional battery leaves the competition in the dust! DJ-200T for 220 MHz.

DJ-160T&DJ-460T

2M H/T is here! And wow!

"Bells & Whistles" is a tame word to use for the new DJ-160T, newest "Magnificent" one from Alinco. Keyboard entry is just one of four ways to enter a frequency in the extended receiver (137-173.995 Mhz) of the DJ-160T. You can store duplex/simplex pairs in any of 20 Memories, or Call Channel, with offsets, and any of 38 encoding subtones. Choose one of 3 scan modes, "Band" "Program" or "Memory" and one of five step ranges in VFO. Priority mode can be used in VFO, Memory or Call. "Dual Watch" allows the DJ-160T to scan 3 seconds alternately on CALL, VFO or one MEMORY. "Pager" is for group or single person alert. Other features include: Auto "Battery Save", Auto "Power Off", and 2-Memory Autodialer. Get 3-watts on standard 700 mah battery, or increased power from built-in DC to DC, or optional 12V battery. The Alinco DJ-160T, now the "Top Gun" with the competition today! DJ-460T for 70cm.

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dio Out and Squelch from the link receiver (TH-45AT), I proceeded to plug in the various cables and boards to the C-64. With the hardware installed and cabled, I gave the installation a final check, and turned on the computer to configure the software.

IMPORTANT: Before making any connections between equipment, or plugging any boards into the computer, make sure all power is turned OFF! Plugging cards into the Commodore while it is powered could damage both Ultra Comshack hardware and the computer!

Software

I use version 7.4 software, the latest at the time I wrote this review. Most of the defaults were acceptable for the first installation. The new software release is menu driven. I found that the Systems manual clearly answered whatever questions cropped up about the software.

Operating the Program

The main program loaded and executed without a fault, and the operating screen displayed the system status and option configuration. Of particular interest was the status of the remote base unit and the link transmitter/receiver. A large dot was in the row next to the radio, in a column for Transmit or in a column for receive. At the bottom of the display is incoming command data from the link radio. Seeing the digits that I keyed into the keypad of my HT was useful. I used this feature to get used to the timing of the data entry operation. The computer monitor doesn't need to be on all the time, only when you wish to monitor system operation.

The current software supports over 100 commands. Table 1 is a list of some of the commands supported in version 7.4. At first I carried around a list of the commands, but I soon started using the Macro feature, which allows you to pre-define complex command sequences and access them with simple commands. Changing VFOs, beam headings, and other operations, are easy with macros. Every command the system recognizes is spoken by a voice synthesizer built into the software. The voice is a little crude, but understandable, and a must for proper operation.

Inverter Stage Mod

I soon found that all the functions on the TS-440S remote base were not changing as they should. I soon learned that, given my software version, and my hardware, I needed to install an inverter stage in the serial data link to the remote base. The CS64S interface has provisions for this feature, and required only a 2N2222 and two 10kΩ resistors. After performing the modification, which was outlined in the Systems manual, the remote base worked as it should.

Making a QSO

My first contact through the remote base was checking into the local 10-10 Wind Farms net. During the contact, I started by standing next to the system, watching it function and gaining confidence in its operation. As my confidence increased, I slowly moved into other rooms of the house, and finally outside. The usefulness of the macro feature soon became apparent as I used the remote base. Once I knew what I was doing, I operated the remote base from a friend's station about five miles down the road.

Autopatch

The autopatch supports both incoming and outgoing calls. I plugged the family phone line into the RJ11 connector on the CS64S interface board and tested the autopatch. When the controller detects an incoming call, the system pages the operator over the 2 meter link transmitter. The system user can then enter the proper code on his transceiver keypad, and answer the call. You can configure the paging mode to page in different ways, depending on your preference.

I tested the autopatch from my front yard. With only one phone line in the house, I resorted to talking with my helper, our eight-year-old son, Eric, on the cellular phone in my truck. This was an impressive feat; the Ultra Comshack worked great. I also succeeded in the opposite direction, by placing a call from my HT to the phone in the truck.

The software allows the operator to restrict outgoing calls to certain numbers, area codes, and prefixes. This is an important feature if the autopatch is to be left open for other users.

Remote 1 and 2 Command Examples

Command	Function
C or D	Scan Up or Scan Down
7	Stop scanning
#A	Change to LSB Mode
#B	Change to USB Mode
#C	Change to AM Mode
#D	Change to FM Mode
#0hhmmss	Set time in HH:MM:SS format
5A	Split on
5B	Split off
XXX•XXXXXA	Enter VFO A frequency
#•B	Rotate 10 degrees clockwise

Autopatch Command Examples

Command	Function
•5	Answer an autopatch page
•4XXXXXXX	Quick dial user entered number
•#	Hang up phone and end patch

Other Options

Rotor Control: Rotor control is accomplished with the HM-1 ($50) beam rotator control option. This hardware, along with the CS-8 (8-latch and relay control card), allows the user to control the Ham "M," Ham 4, or similar (CDR) rotator control box. The HM-1 interface samples meter voltage to determine beam heading. The voice synthesizer announces beam heading. This option allows for ± one degree accuracy with zero to 360 degree rotation control.

Relay Control: There are a total of 16 possible on/off control options available. The CS-8 relay control card ($80) provides for eight and the PK-8 provides the second group of eight. If the HM-1 beam rotator control option is being used, three of the eight control points on the CS-8 are used, leaving 13 for the station operator to use as needed. You can use these on/off control points to turn an amplifier on and off, change antennas, or any other function controlled by either a relay or an open collector transistor switch.

Talking Meters: Using the the PK-8 expansion interface, you can install two talking meters into the system. Each of the two analog meters can read a DC voltage greater than 12 volts. The hardware allows for calibration at the DC inputs. By setting a scale factor in software configuration, you set the range of voltage each meter can monitor. You can set a minimum and maximum trigger point for each meter, and a user-defined macro will be executed when one of the two extremes are reached. A user-defined message is then spoken by the voice synthesizer, announcing the condition. You can use this feature to monitor SWR levels on the remotes, temperature at the remote site, battery voltages, or whatever DC voltage the operator wishes to monitor.

Autoboot Cartridge: You can obtain a personalized program cartridge with the system parameters which will give the system the ability to operate without a disk drive. With the cartridge installed, the Commodore automatically runs the Ultra ComShack software at power on or at reset. You can still use the disk drive, to log if desired, and to load other configuration files. This option enables the Commodore to autoload and execute after a power outage or remote reset.

My C64 would occasionally hang due to power line noise, so the autobooting cartridge really helped when I wasn't near the system. Engineering Consulting provided the necessary software routines to copy configuration file number 1 from your working disk to a disk sent to them for programming the EPROM Autoboot Cartridge ($100).

Remote Reset: Occasionally, you might need to reset the computer and re-loaded the Ultra ComShack software. If you're not near the station, you have to use a remote method. You can do this with the TSDQ, 4-digit touch-tone sequence decoder and latch. This device operates separately from the computer, receiving its audio directly from the link receiver. You need the Auto Boot Program Cartridge for the remote reset.

12 Volt DC Power Supply: You can use a storage battery to power the computer and interface electronics with the model DCPS option. This switching power supply generates the proper voltages for the computer, allowing the system to operate from a battery back-up 12 volt power source. The switcher provides a crystal-controlled 60 Hz 18–20 volt AC signal which allows the computer to keep accurate time without using 115 V AC utility power. This feature is $120.

Packet: This is a new feature to the ComShack line and requires a second Commodore 64/128 computer. The PK-8 option supports a high speed data channel to talk to the second computer. The second Commodore is attached to the packet TNC, and the packet control feature sends "Voice Packets" to the master system It lets you control the master system from packet. Packet and BBS with voice meters (see option above) and alarm inputs are $150. Packet interface and cable, linking PK-8 to C-64, is $50.

Soldering Iron Required

Installing the Ultra ComShack is not a project for the ham who is afraid of the soldering iron. To install the system, you have to make many connections and possibly attach additional wires into your transceivers. You can always find help at a local ham club for a project like this. It took me about six hours and three phone calls to Engineering Consulting to get my system on the air.

Once installed and on the air, you have a clutter of interconnecting wires going all over the place, and PC boards hanging out of the Commodore in all directions. But the many features and ease of operation outweigh the appearance.

The Ultra ComShack is an inexpensive and relatively simple approach to accomplishing the complex task of remote station operation. It is feature-packed, and the sky is the limit for ideas and ways to use it. 73

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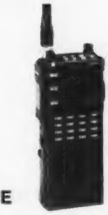

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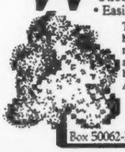

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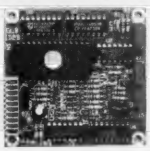

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73 Review

by Ted Drude KA9ELV

AEA's New MM-3: The Morse Machine

Is this the ultimate CW memory keyer?

Advanced Electronic Applications, Inc.
2006–196th St. SW
PO Box 2160
Lynnwood WA 98036
Tel. (206) 775-7373
Price Class: $190.

Take heart, CW enthusiasts! In the midst of packet mania, no-code licenses, and digital everything, you're still in the hearts and minds of some ham radio equipment manufacturers. A case in point is the new MM-3 Morse memory keyer from Advanced Electronic Applications (AEA). AEA, who previously produced the MM-1 and MM-2 MorseMatic keyers, started hearing from CW enthusiasts when their original products went out of production a few years ago.

While computerized multimode data controllers, like the PK-232, were becoming all the rage, many hams were looking for a simpler CW alternative. There were still plenty of CW contesters and DXers out there who relied heavily on their old AEA MorseMatic keyers. So, after working for quite a while on an improved design, AEA finally released the new MorseMatic successor, the MM-3. AEA calls it, appropriately, "The Morse Machine."

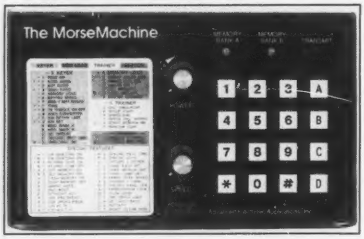
A Memory Keyer . . . and More!

While advertised as "the ultimate memory keyer," the MM-3 is actually more than just a memory keyer. It holds up to 20 different CW messages, with a total storage of 8,400 to 36,000 characters. But the MM-3 is also capable of operating as a programmable CW beacon, random code trainer, and a QSO simulator. While designed as a completely stand-alone product, the MM-3 also has a serial I/O port to interface with your terminal or computer, to act as a Morse code terminal with ASCII conversion. In short, anything you're likely to want to do with Morse code can be done with the MM-3.

What's Behind the MM-3?

The MM-3 is packaged in a small metal enclosure 7.4" x 4.75" x 1.9". The rear panel of the MM-3 has several jacks and connectors. Looking from left to right, first you have a DC power plug and two RCA phono jacks, SERIAL IN and SERIAL OUT, which form the optional computer I/O port. Next, an RCA phono PTT, push-to-talk, jack in case your transmitter needs a PTT line in lieu of a CW keying line; then a stereo phone jack for keyer paddles or a straight key, and a mini-phone jack for sidetone audio for headphones. Then you have two RCA phono jacks (with the proper male connectors) which provide both positive and negative keying outputs (+50V at 500 mA or −35V at 200 mA max.).

Finally, at the far right, there is a mysterious DIN-5 jack labeled REMOTE MEMORY. This DIN-5 jack is clearly shown in descriptive diagrams in the 50-page *User's Manual*, and it's also shown in the MM-3 schematic, but its actual use is never fully explained. Most likely, it allows you to select keyer memories with a remote switch (good guess, huh?).



AEA's MM-3 Morse Machine, the CW state-of-the art for enthusiasts.

Front Panel Controls

Moving around to the MM-3's front panel, there is a touch-tone style keypad on the right with four extra keys: A, B, C, and D. The keypad is primarily used to set the mode of operation. For example: pressing the asterisk (*) and 5 on the keypad puts the MM-3 into the Trainer mode. Once in an operating mode, you can use the keypad to further select special features in that mode. For example, in Trainer mode, hit the D key, and the MM-3 will start sending random code samples. (If you set the MM-3 in the computer I/O mode, you can then send all the mode commands from any RS-232 port—computer, terminal, TNC, or what have you.)

At the top left of the front panel are four green LEDs which show the primary operating mode the MM-3 is currently in: Keyer, Memory Load, Trainer, or Beacon. Below these LEDs is a color coded command summary chart, showing the various keypad command sequences. While you'll still need the MM-3 user's manual for detailed reference, with a little experimentation you can figure out how to access most features from the panel chart. At the top right of the front panel are three more LEDs. Two yellow ones show which memory bank, A or B, is active at the moment. A single red TRANSMIT LED tells you when the keyer is putting out a signal to your rig.

In the center of the front panel are two pots. One controls functions as an on/off switch, and it also controls the volume of the CW sidetone audio. The other pot adjusts the playback speed of stored memory messages. It normally ranges from 5–45 wpm, but you can program it for other speeds as well. You can also control playback speed precisely via keypad commands, by punching in the exact wpm with the correct command sequence.

The Intel 8031 CPU and MM-3 Memory

The MM-3, a microprocessor controlled product, uses an Intel 8031 CPU, a second generation microcontroller in the 8051 family, but without a factory-programmed ROM. Instead, the MM-3 uses a socketed 27C256 EPROM for its firmware, allowing field upgrades. In fact, we received a new EPROM for the MM-3 while doing this review. AEA had modified the firmware to make the code speed control knob programmable from 2–99 wpm, instead of just the default 5–45 wpm.

As mentioned earlier, the MM-3 can store and replay up to 20 different CW messages. The two memory banks, A and B, store ten separate messages each, numbered 0–9. The memory for messages is loaded in a special mode, which also allows individual message editing. CW playback occurs in the keyer mode. You simply select the desired memory bank and message number on the numeric pad. Your message then plays back at the pre-selected wpm speed, or you can choose to vary it on the fly via the speed control pot on the front panel.

Character memory is stored in a 6264 static RAM chip. Standard memory is 8K bytes, or about 8,400 Morse characters. The 6264 RAM is socketed, and can be user-upgraded to a 43256 chip for about $25. That bumps the MM-3's memory to 32K bytes, or about 36,000 Morse characters. All the character memory is soft partitioned, and maintained with a lithium battery backup. Powered down, the MM-3 should still hold its memories for a couple of years!

Power Source and Draw

Any 9–16V DC power source, drawing about 350 mA, will power the MM-3. AEA sells an optional AC power supply for $16. Most users can probably use their rig's existing power supply. For those interested in operating the MM-3 on battery or solar power, AEA provides details on getting the current drain even lower. You can disable the sidetone speaker, disconnect the panel LEDs and serial port drivers, and replace a couple of its VLSI chips with CMOS equivalents, to obtain about

70 mA power consumption. This should especially interest those doing QRP and remote beacon work.

MM-3 Advanced Operating Features

The Keyer function of the MM-3 is a complete contest keyer with automatic serial number insertion and incrementing in any memory message. Serial numbers can range from 1 to 9,999. You can use the front panel speed knob to send at any speed from 2–99 wpm, or enter an exact wpm with the keypad, and then toggle between the two any time.

You can also select dot and dash memory on/off, audio sidetone on/off, dot-space or dash-space ratios, and bug, iambic or straight key modes, and many other parameters. In the Memory Load mode, you can enter and edit messages.

Trainer Mode

The MM-3's Trainer mode is especially powerful. You can set random code practice sessions for a specified duration in minutes, using programmable code speeds. You can have sessions with steadily increasing code speed. You can also select easy, medium, or hard character sets. All code sent by the MM-3 is echoed out the RS-232 serial port, so you can check your practice copy against the original by looking at a terminal or computer screen.

An interesting part of the Trainer mode is the QSO simulator, based on AEA's successful "Dr. QSO" cartridge for the Commodore 64 computer. The simulator allows the user to actually practice code via a simulated CW QSO. The MM-3 will call CQ, including a callsign, via its sidetone monitor and wait for your response. You can then converse with the MM-3 by returning its CQ with your own call and completing the QSO. (The MM-3 user's manual helps you understand the QSO process in detail.) We feel this is the most painless way for Novices and Technicians to get their code speed up, and they don't even have to fire up their rigs!

In the Beacon mode, you can program the MM-3 as an automatic CW beacon, repeating the message every 1 to 999 seconds. Use the keypad or RS-232 serial port-to-computer for programming. This makes it easy to remotely program the MM-3 Beacon via a phone modem or TNC link.

The MM-3 user manual describes several other creative "modes". With an AEA CP-100 computer patch, the MM-3 can be a Morse reader as well as sender. You can use the MM-3 to convert ASCII to Morse output for blind operators on packet, for example. You can also slow on-the-air Morse code down and copy it with a PK-232 controller.

Whether You're an Extra or a Novice

The MM-3 is a worthy successor to the original MorseMatic keyers. AEA has done a superior job in providing a new generation product for CW operators. The MM-3 proves you don't necessarily need a computer to keep up with the CW state-of-the-art.

You may write Ted B. Drude KA9ELV at 6170 Quito Avenue, Cocoa FL 32927.

Number 15 on your Feedback card

73 Review

by Pete Putman KT2B

MFJ's 941D Versa Tuner II

MFJ Enterprises, Inc.
PO Box 494
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FAX: (601) 323-6551;
Order: (800) 647-1800.
Price Class: $110.

Antenna tuner/SWR bridge in one versatile unit.

We amateur radio operators are fairly smart fellows, aren't we? After all, we have to master Morse Code and comprehend a wide variety of technical topics ranging from baud rates to beamwidth. We understand feedpoint impedance, reactance, resonance, angles of radiation, and the care, feeding and use of baluns, right?

So how do we account for all these guys who load up gutters as antennas, operate 160 meters using 15 feet of longwire in the attic, and insist on using a tribander to call CQ on 75 phone? Hmmmm?

The truth is that our world is full of compromise. Sure, we know darn well that a half-wave dipole for 160m takes up 240 feet, and it should be at least 60 feet above the ground to do any good, and we must use a balun at the feedpoint. Then we go outside, toss 30 feet of wire across some tree branches just out of reach, and try to work 4X4s with it. (Sigh . . .)

If necessity is the mother of invention, then compromise is the mother of the antenna tuner. There are probably more variations of this device on the market today than there are handi-talkies—a staggering thought! And yet without them, many amateurs would not have worked those 4X4s on 160, 80 or even 40 meters. The antenna tuner is indeed a key part of an amateur's station. And so it is for me with the MFJ 941D Versa Tuner II, a 300W PEP tuner incorporating an SWR bridge, power meter and 4:1 balun all in a tidy box.

Lured by Sunspots

After spending the better part of the last 6 years on VHF and UHF, I've grown accustomed to broad-banded 50Ω antenna feeds. But the siren song of sunspots has lured me back to HF and the attendant problems with antennas. I recently erected a Cushcraft A3 tribander with 40 meter add-on kit, and while it works quite well, my Kenwood TS-430S doesn't like to load into it at several points in the 40 and 15 meter bands.

As a compromise, I set the elements on the A3 for coverage of the middle portion of 40 meters, resulting in VSWR readings of over 2:1 below 7.090 and above 7.220 MHz. I also obtained 2:1 readings below 21.375 MHz (10 meters and 20 meters are under 2:1 across each band). Time to pick up an antenna tuner!

Why Use a Tuner?

Modern solid-state transceivers want to see a range of 50 to 75Ω in everyday operation. Internal ALC circuits measure increased collector current as a function of VSWR mismatches and "throttle back" the drive to keep maximum current below a specified value, thus insuring long life for your final transistors. Most transceivers have their ALC circuits set to "kick in" at about a 1.5:1 VSWR (75Ω), but the truth is that with ballasted emitter devices in the finals, 2:1 mismatches don't present much of a problem.

I've reset the ALC circuit in my HF radios to allow as much as a 2:1 mismatch, thereby allowing greater frequency excursions for a given antenna. It's only when impedances reach above 2:1 that things get tricky, and here's where an antenna tuner really helps out. But the important point to remember is to optimize your antenna for the chosen band. Get it as high as possible, strive for the longest possible physical length with respect to optimum, and use a good ground. If your tuner is looking at realistic impedances, it can be a potent tool.

MFJ Tuners, and the 941D in Particular

MFJ manufactures a bewildering array of tuners, starting with the 16010 Random Wire model and stretching all the way up to the MFJ 989C 3 kW version. I considered using the scientific method of closing my eyes and throwing a dart at the page to make a choice, but after careful study decided on the 941D for several reasons: (1) I only run 100 watts on HF; (2) it has a built-in SWR bridge/power meter; and (3) it will handle 2 coaxial lines, one balanced and one unbalanced line.

The 941D Versa Tuner packs quite a bit in a small package. It checks in at 3"H x 10"W x 7"D, and weighs just a couple of pounds. The chassis is finished in black, fitting right in with most of today's transceivers. Front panel controls from left to right are SWR SENSITIVITY, ANTENNA SELECTOR, TRANSMITTER MATCHING, INDUCTOR SELECTOR, and ANTENNA MATCHING. In addition, pushbuttons select FWD/REV, 300/30W range, or POWER/SWR functions on the front panel meter.

Rear panel connections are for BYPASS COAX, COAX 1, COAX 2, and a combination of binding posts that allow connection of an unbalanced wire, balanced feedline and ground. The 941D has a built-in 4:1 balun for a 200 or 300Ω ladder or ribbon line, with a maximum rating of 300 watts PEP. Theoretically, you could have 2 coax lines and one longwire connected at the same time to the 941D. (Note that the BYPASS coax does just that and is routed around the tuner.)

Continued on page 82

QRP

Low Power Operation

Michael Bryce WB8VGE
2225 Mayflower NW
Massillon OH 44646

NR5A's 17m Receiver Converter

With a little luck, you should have a fully operational 30 meter transmitter running. This month, we'll look at improving it a bit. But first, I mentioned last month that I had a small receiver converter, and I'll get this out of the way so you can start getting a feel for the new WARC bands.

Jerry Felts NR5A designed this converter. You may contact him at PO Box 1033, Elder SD 57719. Be sure to enclose an SASE. Though I didn't have time to put one of these together before my deadline, I related some ideas to Jerry which I'll pass along to you.

First, take a close look at the schematic (Figure 1). The NE602 is used as an oscillator. Second, as Jerry noted to me in his letters, the front end is strictly guesswork. Third, I told Jerry that T-60-2 cores would increase the Q of the circuit. Fourth, the converter uses the 3.5 MHz band, which should be of special interest to HW-7 and HW-8 users.

The NE602 is very sensitive about its supply voltage. Although Jerry added a current-limiting resistor, I'd feel much better if a voltage regulator were added. The NE602 will go up in smoke if the supply voltage is over 8 volts. Install a 78L08 in place of the 2.2kΩ resistor. Of course, you could use a zener diode rated below 8 volts. If you can't find a 78L08 in the junk box, use a 7805 by adding some diodes in the ground lead of the regulator. This increases the voltage by 0.7 volts for each diode. You can also install a voltage divider and get the same results. Just play with resistor values until you're happy with the results. The bottom line is that you can always run the NE602 at 5 volts, with a tad less gain.

No matter how you build the converter, tune-up is quite simple. Just tune the front end for maximum signal, then tune the 10.7 MHz IF can for maximum signal. Repeat this cycle for maximum signal. That's all there is to it. I've included the front end circuits (Figure 2) you need for different bands. Again, I haven't tried out this converter, so builder beware; it may need some fine tuning. Address your questions to Jerry Felts at the address above.

30m Transmitter Mods

Now that you've got a receiving converter underway, let's get back to the 30 meter transmitter. This time around (see last column) we'll add a simple transmit controller.

I've used this circuit for years and have had no trouble at all with it. In fact, if you use a reed relay, you can get just about full QSK. The only factor holding you back is the receiver AGC recovery time.

Build the circuit on a small piece of perfboard and install it in the same cabinet as the transmitter. I placed the switching circuits on the same board as the transmitter circuit, but that placement isn't critical. I used a junk box 12 volt relay. If your junk box comes up empty, Radio Shack has a very good line to choose from.

Remember, the larger the relay, the longer it will take to go from open to closed, and vice versa. If you're not worried about QSK, you should have no trouble using what is on hand. Because the relay will be pulling in when the key is closed, the faster the relay closes, the less distorted the first character sent will be.

How the Relay Works

The switching transistor must be able to pass the current drawn by the relay. In my case, a cheap 2N2222 works quite well (see Figure 3). If the transistor/relay combination you pick causes the relay to hold in, after the delay has timed out, add some diodes in the emitter lead. Two diodes add about 1.5 volts above ground and keep the relay from staying on after the control voltage is removed—very helpful when using a sensitive relay.

Here's how it works. When you close the key on the transmitter, 12 volts is applied to the PA and oscillator. The relay key line is also connected to the PA supply line. The 12 volts passes through the diode and charges up the capacitor. The diode keeps the charge from being discharged back into the PA transistor. A simple RC network consisting of R1, R2, and C1, set the time. When the capacitor is charged very

Continued on page 84

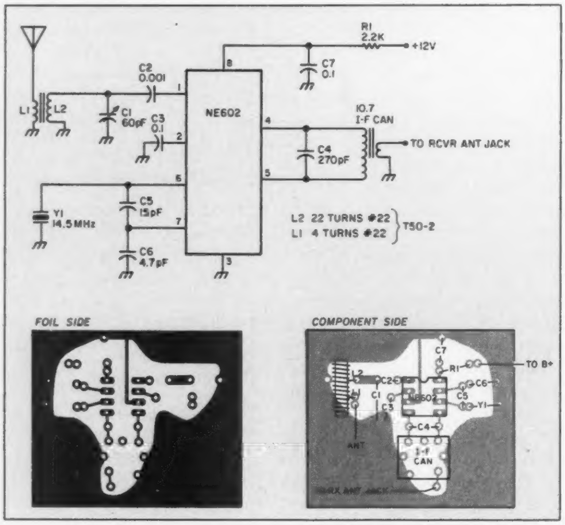

Figure 1. Schematic, parts placement, and PCB foil diagram for the 17m receiver converter.

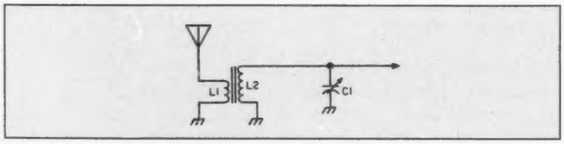

Figure 2. Front end for the converter. Values:

Band	*L1*	*L2*	*C1*	*XTAL*
30m	*3T*	*25T*	*50pF*	*6.6 MHz*
40m	*5T*	*51T*	*60pF*	*3.5 MHz*
20m	*2T*	*26T*	*60pF*	*10.5 MHz*
15m	*2T*	*20T*	*50pF*	*17.5 MHz*

Use #28 wire on T-50-2 for 40 meters. Wind the same gauge wire on T-60-2 cores for the other bands.

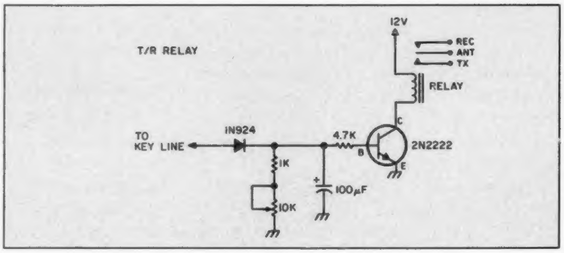

Figure 3. Transmit controller mod for the 30m transmitter.

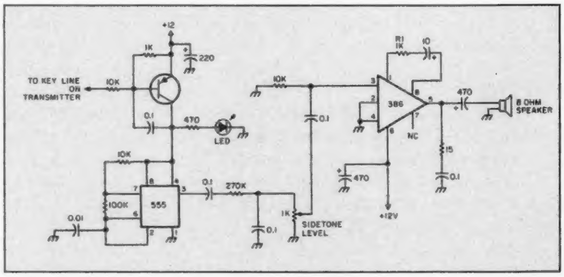

Figure 4. Sidetone generator circuit for the 30m transmitter.

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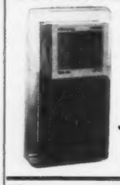

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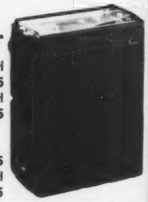

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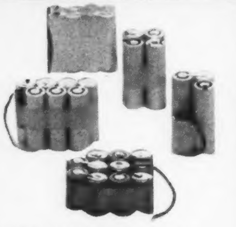

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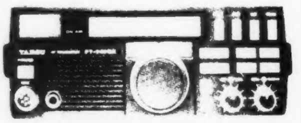

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Home-brew Spectrum Analyzer

Project for DXers and experimenters alike.

by Gregory R. McIntire KE0UV

If you've always wanted a spectrum analyzer, but figured it was way out of your budget, here's the answer! All the components required to build your own HF spectrum analyzer may be found in a well-stocked junk box. In the worst case, it'll run you less than ten dollars, as long as you already own an oscilloscope and an inexpensive, general coverage shortwave (SW) receiver.

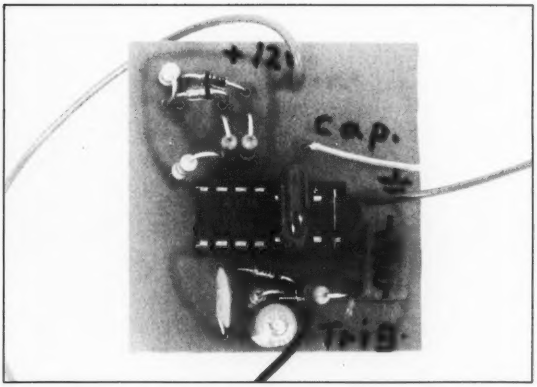
+12v
cap.
Trig.

Photo A. Top view of the spectrum analyzer interface.

Overview

This system is surprisingly simple. Imagine a "scanning receiver" whose IF output is rectified into DC. This DC signal is then fed to the vertical input of an oscilloscope. The scope's trace beam scans the face of the CRT at exactly the same rate as that of the scanning receiver. Thus, whenever the receiver scans across a received signal, a DC voltage proportionate to the strength of the received signal causes the trace on the scope's CRT to deflect upward. As soon as the scanner passes by the signal, the trace deflects back down. If the scan rate is fast enough, a continuous trace appears on the CRT with vertical spikes or deflections of varying magnitude which correspond to the RF signals in the path of the scanner.

This spectrum analyzer interface contains its own HF receiver. Simply tune the SW receiver to the portion of the HF spectrum you want to view, or feed the antenna input of the SW receiver with the wideband IF signal of your HF transceiver. Using the latter system, any signal on the frequency to which your transceiver is tuned will show up in the center of the CRT. This signal, too, marks the middle of the spectrum range the analyzer is looking at.

The amount of spectrum you can view depends on the amount of bandwidth available at the IF (before the final IF filtering) of your transceiver. This also requires that the IF frequency be within the tuning range of the SW receiver. If your IF is 455 kHz, you can use a simple AM broadcast band receiver.

Theory and Construction

Since it's unlikely many of you have the same scope and SW receiver I use, I give relatively generalized instructions here. With a little care, however, you should be able to easily apply this idea to most models of SW receivers, and to almost any oscilloscope. If you have my particular setup, though, contact me for help on finding the specific connections on the DX-360. Please send an SASE.

First, obtain almost any simple, low-cost scope. I use a forty-dollar, 2 MHz, used scope.

Next, obtain a simple, LC tuned, shortwave receiver. My Radio Shack Realistic DX-360 works great. However, since I couldn't see the component side of the board, it was tough figuring out what was what. After a lot of trial and error, I found what I was looking for. It's easiest if one terminal of the tuning capacitor is connected directly to ground.

Now see the schematic in Figure 1. The receiver provides the signal (DC voltage) for the oscilloscope to display. All you have to build is a very simple device that will (1) cause the receiver to "scan" a portion of the HF spectrum and (2) provide a "sync" signal to the scope so it will also scan the CRT at the same rate.

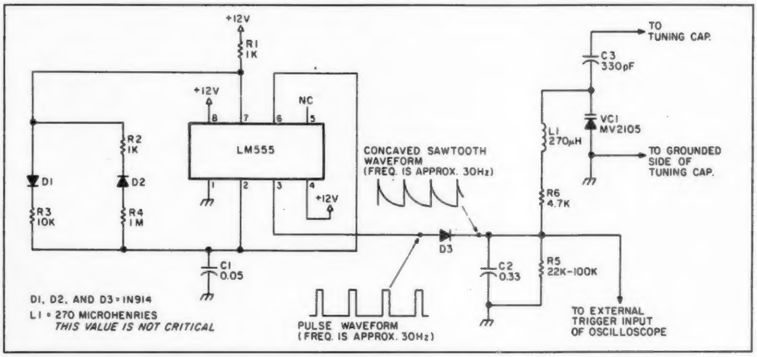
+12V
R1
1K
+12V
8
7
6
NC
5
LM555
1
2
3
4
+12V
R2
1K
D1
D2
R3
10K
R4
1M
C1
0.05
CONCAVED SAWTOOTH
WAVEFORM
(FREQ. IS APPROX. 30Hz)
D3
PULSE WAVEFORM
(FREQ. IS APPROX. 30Hz)
C2
0.33
R5
22K-100K
R6
4.7K
L1
270μH
C3
330pF
VC1
MV2105
TO
TUNING CAP.
TO GROUNDED
SIDE OF
TUNING CAP.
TO EXTERNAL
TRIGGER INPUT
OF OSCILLOSCOPE
D1, D2, AND D3 = 1N914
L1 = 270 MICROHENRIES
THIS VALUE IS NOT CRITICAL

Figure 1. Schematic for the $10 or less home-brew spectrum analyzer.

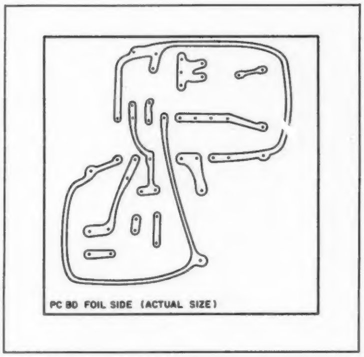
PC BD FOIL SIDE (ACTUAL SIZE)

Figure 2. Foil side of board, actual size.

Two Birds With One Stone

The 555 timer IC takes care of both of the above. It is configured as a square wave generator, but with the ON part of the wave being very short relative to the OFF part. This is essentially a pulse wave. The pulse signal feeds a paralleled capacitor and resistor. The pulse charges the cap very rapidly, and then the resistor discharges the cap slowly. This creates a "concave" sawtooth waveform of about 25 Hz.

We need this waveform to create "linearity" of the scanning frequency of the SW receiver. The nonlinear characteristic of a varactor diode, and the nonlinear fashion in which the LC tuning circuit of the SW receiver operates, requires a nonlinear voltage to be fed to the varactor, but with its nonlinearity inverted in order to end up with *linear* tuning.

This DC voltage feeds a varactor diode (tuning diode) that is connected in parallel to the existing mechanical tuning capacitor of the shortwave receiver. The sawtooth wave is also fed to the scope's external trigger or sync terminal. (See below if your scope doesn't have an external trigger.)

Optimizing the Sawtooth Waveform

Select values of C2 and R5 to give a smooth concave sawtooth waveform as measured on the cathode of D3. This is a trial and error process. If R5 is too large, the scanning range is narrower and the minimum capacitance of VC1 will never be reached. The maximum capacitance range of the varactor—and thus the maximum possible spectrum scanning range—is never exploited since R5 will not be able to discharge C2 to zero volts. If R5 is too small, however, the scanning range will be at its maximum but will scan too fast. In this case, the waveform drops off very rapidly to zero volts before the cycle finishes.

You may want to make slight variations on

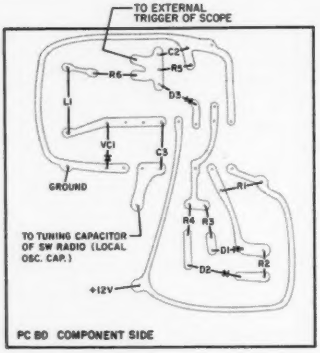
TO EXTERNAL TRIGGER OF SCOPE
C2
R5
R6
D3
L1
VC1
C3
GROUND
R1
R4
R3
TO TUNING CAPACITOR OF SW RADIO (LOCAL OSC. CAP.)
D1
R2
D2
+12V
PC BD COMPONENT SIDE

Figure 3. Parts placement on foil, enlarged. The 8-pin IC is in a 16-pin dip socket with pin 1 at 1 in the drawing. Leave pin 5 position undrilled to avoid breaking the trace from pin 4 to +12 volts. Note that C3 and VC1 plug into the 16-pin DIP socket for easy removal for experimentation. C3 and VC1 can also each be paralleled with other values via the unfilled DIP socket holes.

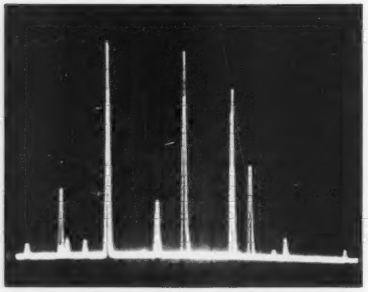

Photo B. The o'scope CRT showing signals in a 150 kHz piece of spectrum on 20m.

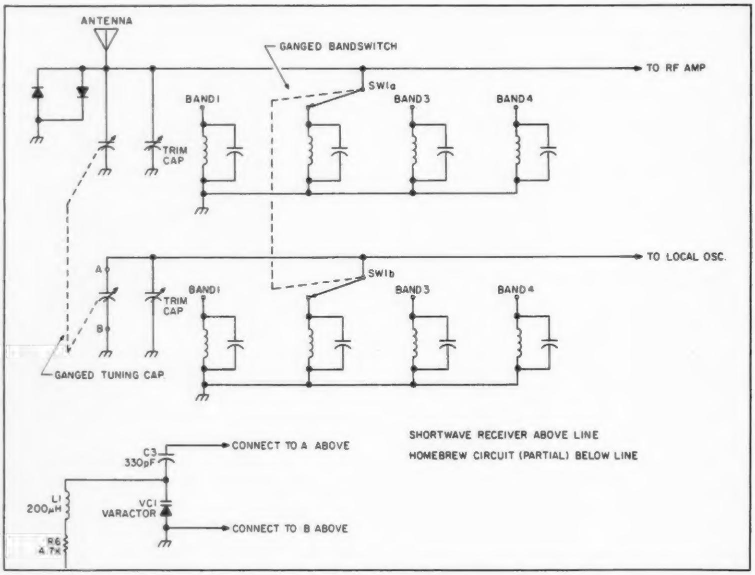
ANTENNA
GANGED BANDSWITCH
TO RF AMP
SW1a
BAND1
BAND3
BAND4
TRIM CAP
TO LOCAL OSC.
A
SW1b
B
GANGED TUNING CAP.
C3 330pF
CONNECT TO A ABOVE
L1 200µH
VC1 VARACTOR
CONNECT TO B ABOVE
R6 4.7K
SHORTWAVE RECEIVER ABOVE LINE
HOMEBREW CIRCUIT (PARTIAL) BELOW LINE

Figure 4. A typical SW receiver RF and local oscillator tuning circuit. The lead from C3 from the spectrum analyzer attaches to point A; the other spectrum analyzer lead (from VC1) attaches to point B.

Photos C,D. Greg KE0UV getting ready to to spot some DX on 10m using the $10 Spectrum Analyzer. Photo D is a close-up of the system, comprised of the o'scope, the scanning receiver (the DX-360) and the interface, which sits atop the DX-360.

these two values if the finished spectrum analyzer's display has wider spikes on one side of the CRT than the other. You'll likely need alter only R5's value.

If your scope does not have an external trigger input, you may be able to tap into the linear sawtooth wave inside the scope. In this case, you can eliminate the 555 timer circuit. Simply feed this sawtooth, which may need to be voltage divided, to obtain a level of around 0–12 volts, to the varactor. Couple the sawtooth to L1 through a capacitor. (Experiment to find the proper value of this cap—0.001 µF is a good starting point.) This will create the concave sawtooth waveform suitable for driving the varactor.

Setting the "Viewed" Bandwidth

The varactor tuning diode (VC1) I use is rated at 15 pF, but this can vary according to your system. You may need to change this value, and/or the value of C3, depending on how much scanning range or bandwidth you want. A 33 pF varactor gave too much tuning range; too much of the spectrum was displayed on the CRT, which caused a loss of resolution and melding of the displayed signals. I suggest using a 16-pin DIP package for the 555, so that you can use the extra eight sockets to try out different VC1/C3 combos. Remember that VC1 and C3 are simply two capacitors in series, so you can calculate what amounts of change will have what affects on the total capacitance, using the standard series capacitance formula: C1 x C2/C1 + C2.

If you are tuned to the high end of the dial of the SW receiver, you will want a small varactor, and vice versa. The values I chose give a display of about 325 kHz wide. The wideband IF of my Yaesu FT-101ZD is also about this wide, so this means I can view about 150 kHz of spectrum on both sides of the frequency to which the Yaesu is tuned.

Connect C3 and VC1, in series, across the *local oscillator (LO)* tuning capacitor in the SW receiver. Since we are tuning only a relatively small part of the spectrum, we don't need to tune the RF tank circuit. See Figures 4 and 5.

You may have to mount a trimmer capacitor, set at approximately the same value as the varactor diode (VC1), across the RF section. of the main tuning capacitor of the shortwave receiver. This is because the LO "scans" a slightly lower range of frequencies than the RF section of the tuning cap is centered on. I tried it without a trimcap and it worked, but I get higher AGC voltage to the vertical input of the o'scope with this trimmer installed, and thus taller spikes on the CRT display.

If room permits, mount C3, VC1 and L1 inside the receiver cabinet, as close as possible to the LO tuning cap. There is very little room inside my DX-360, so I simply soldered wires to each terminal of the tuning cap, (one of these wires is the receiver's ground) and brought the two wires to the outside of the radio via a ⅛″ stereo phone jack. I used the third conductor of the stereo jack to bring out the AGC voltage of the receiver to feed the scope's vertical input.

Optimizing the Sync Frequency

I selected the frequency of the 555 timer circuit to give a smooth, sharp display on the CRT. It should generate pulses in the 20–30 Hertz range. Much below 20 Hz gives a flickering CRT display. Much above 30 Hz widens and smears the displayed signals, probably due to the SW receiver's AGC response time.

Make the connection to the AGC circuit of the SW receiver at a point before this AGC voltage is acted upon by any "timed decay" circuitry. If your SW receiver has an S-meter, try tapping into the AGC voltage there. Connect your scope to the S-meter, then manually tune the receiver across some shortwave signals and determine how fast the AGC voltage rises and falls. It should be *very* fast. If it is not, then work backwards from the S-meter till you get to a point where the AGC voltage is fast.

There's a point just after the IF filter where a portion of the IF is rectified. This is the AGC voltage. You may also be able to tap into the AGC voltage at the same point that it is fed back to the RF amp.

The aim is to probe around with the scope until you find a point where you get a DC voltage proportionate to the strength of a received signal with instantaneous response as you tune. When you find it, connect a wire to it. Bring the wire out of the receiver's cabinet and connect it to the vertical input of the scope.

The IF filter of the scanning receiver limits the width of each displayed signal. The narrower the filter, the better. I temporarily inserted in cascade (series) a 4 kHz filter with the 6–8 kHz wide filters in my DX-360, and got much narrower spikes on the CRT display. A 2 to 3 kHz filter would be ideal.

I recommend using a metal enclosure to keep out stray RF. Also, use shielded cable from the IF of the transceiver to the antenna input of the shortwave receiver, to keep everything *but* the IF out of the SW receiver.

Parts List

R1,R2	1k	¼ W
R3	10k	¼ W
R4	1 Meg	¼ W
R5	47k	(may be 22k–100k) ¼ W
R6	4.7k	¼ W
C1	0.05	disc ceramic
C2	0.33µF	electrolytic (any temp stable cap)
C3	330pF	mica or any stable cap (other values may be substituted, depending on desired scan range)
VC1	15pF	varactor diode MV2105
L1	150 to 300 µH inductor 43LS154 or 43LS564	
D1,D2, D3	1N914 or any small signal silicon diode	
U1	LM555 or NE555 timer IC	

DC Electronics, PO Box 3203, Scottsdale AZ 85257, (800-423-0070) has all the parts for this project. Since they require a minimum $15 order, you may want to get several values of varactor diodes.

800-882-1343

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	List	JUN's
IC-781 New Deluxe HF Rig	$5995	Call $
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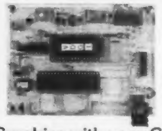

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Let the Fun Begin!

After constructing the simple interface, power it up with a 12 volt supply and listen to the audio of the SW receiver. It should have a buzzing sound as it very rapidly scans. Tune the receiver to a busy shortwave band. You'll note that the added capacitance of the varactor diode caused the dial calibration on the receiver to be a bit inaccurate, and that you will have to tune the receiver higher than normal.

If all checks out so far, turn off the power and connect the AGC wire to the scope's vertical input. Set the triggering function of the scope to *external* and connect the external trigger or sync input of the scope to either the concave sawtooth waveform, or to the pulsed wave directly from pin 3 of the 555 IC. Turn the power back on and adjust the scope's input attenuator until you get a display on the screen. Now set the scope's sweep speed until it sweeps the entire CRT at a rate slightly faster than the 555's frequency. I set my scope's timebase at 1 millisecond per division and use the variable sweep control to slow it down.

> ***"All the components required to build your own HF spectrum analyzer may be found in a well-stocked junk box."***

Now disconnect the antenna from the SW receiver, and connect the antenna input of the receiver to the wideband IF output of your transceiver. If your transceiver does not have an IF output jack, look for a source of wideband IF immediately before the IF filter, and bring it out via a wire. This signal is used only to feed the antenna input of the shortwave scanning receiver, so you can loosely couple it to the antenna input, with a resistor in line. Choose a resistance that will give maximum IF signal to the scanning receiver without overloading its front end. You may first want to use a pot with a known range to determine this, and then replace it with a fixed resistor with the appropriate value. I used a 100k resistor for the DX-360's input.

The last IF frequency of my Yaesu FT-101ZD is 8.9 MHz, so I simply tune the SW receiver slightly above that setting on its dial. Then I tune the Yaesu to a *strong* CW station and watch the spikes on the CRT until I identify the one that I am hearing. Next, I tune the SW receiver until that particular spike is in the center of the CRT display.

Now, as I tune the Yaesu, the signals on the display move left or right in such a manner that the signal I'm tuned to is always displayed in the *center* of the CRT screen.

If the IF of your transceiver is 455 kHz, replace the SW receiver with a simple AM broadcast band receiver. Tune the AM receiver to the low end of the dial, and you may have to use a 100 pF or higher varactor diode. (Simply parallel two or more varactors to get higher values.)

Of course, you can analyze chunks of spectrum the SW receiver itself tunes through. Just unhook the transceiver from the setup, and replace the SW receiver's original antenna (or something with higher gain.) Tune the receiver to the band of interest and view the activity on the scope CRT. One disadvantage of this is that, to maintain the same spectrum viewing width, you would have to swap in and out different values of VC1 for the lower, middle, and upper sections of the dial on the SW receiver.

So Now That You've Built It . . .

. . . what do you use your spectrum analyzer for? Imagine sitting in front of your rig in the wee hours of the morning, hoping to work some rare DX. As you sit and listen, slowly tuning across a seemingly dead band (which you know will soon be opening!), you have your eyes focused on the CRT. You see a small *pip* about three-fourths of an inch to the left of center; you watch it for a moment, just to be sure it isn't noise. Sure enough, it has the rhythm of a CW signal! Quickly, you tune downward and watch as it moves to the right. As it becomes centered on the CRT, you hear it. While working this station, you see another signal appear on the CRT. You quickly make your QSL info exchange and tune till this new signal is centered.

It's also useful for those who take an explorer's interest in what goes on on the E-M wave spectrum. For example, I am fascinated at watching and trying to analyze the myriad of sweepers, or "runners," on 10 meters as they go racing left and right across the CRT. As they pass the center, you hear a *peep*. A lot of strange stuff goes on on this band! If you are a birdwatcher, the only place you will ever SEE the woodpecker is on your spectrum analyzer. (And the woodpecker is indeed a strange bird to see!)

Conclusion

The most time consuming part of this project usually is trying to locate the AGC circuit and the local oscillator LC tank circuit of the SW receiver. Construction technique isn't critical, although the varactor should not be located too far from the LC circuit. I breadboarded this circuit using 12-inch long connecting wires, and it worked just fine. For display stability, however, keep connecting lengths as short as possible.

Now, you can build from the junkbox a feature for which avid DXers spend additional thousands of dollars in commercial amateur gear! 73

Gregory R. McIntire KE0UV can be reached at Hillsview Tr. Crt., Lot 92, Belle Fourche SD 57717. Greg KE0UV has been licensed since May '87, and has SWLed since '81. Other hobbies include beekeeping.

ABOVE AND BEYOND

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More on Frequency Counters and Accuracy

Last month I talked about commercial and surplus frequency counters. I suggested you pick up an older HP-5245 type counter because it's cheap and highly accurate. I checked the counter's internal standard using a low frequency receiver at 60 kHz.

At first, I had problems with interference. Connected to an outside antenna, the LF receiver not only picked up the desired signal, but some junk as well. It especially received the 15.750 kHz signals from the horizontal oscillators in most TVs. When operating near "dirty" TVs, the noise on the fourth harmonic almost covered the 60 kHz signal.

Low Frequency Calibration Antenna

To solve this problem, N6IZW came up with the easy-to-build ferrite antenna. With proper selection of the capacitor/inductor ratio, you can use it on almost any frequency up to approximately 1 MHz.

This high-Q ferrite rod antenna has a VMOS FET to convert the high impedance of the antenna to the low impedance of the receiver's input.

I got all components from the junk box. Bought new, components should cost no more than $10. At a local surplus store, I found ferrite rods 2" long and ½" in diameter. I stacked five of them to make a 10" rod and secured them with scotch tape. I went easy on the tape because I wanted to wind the coil close to the ferrite material. You can use other kinds of rods, including old ferrite loopstick antennas from FM radios. The bigger the better, up to about 12" long.

Winding The Coil

Making the coil is really a two-person job. You can do it by yourself, but the slow winding procedure, considering the number of turns, is tiring. However, you can make a small winding jig using a low speed motor. I used my cordless screwdriver. Securing a short, ¼" bolt head to the ferrite rod, I chucked the bolt in the cordless screwdriver. The low turning speed of the tool's motor, along with careful support, helped protect the awkward rod.

Hand-feed the #36 gauge wire in a lathe-like manner. Wind the coil in a single layer. Although I made a few winding errors, they didn't alter the antenna's performance. The coil has about 60–70 turns per inch.

Tune the coil to frequency with a 650 pF capacitor. Use a silver-dipped mica-type for high Q, and a variable capacitor for fine tuning adjustments.

See the Figure for details of the coil and amplifier construction. Parts placement isn't critical. You can put the finished coil and amplifier into a short piece of plastic pipe to protect them. Take the finished coil with its fixed and variable capacitor attached. Then couple a few turns on the coil for testing. This link is connected to your low frequency oscillator.

Next, calibrate the antenna to the desired frequency. I adjusted my antenna to 60 kHz by measuring the peak (high reading) voltage as it developed across the full coil-capacitor combination. You can adjust either the capacitor or the turns on your coil for 60 kHz.

The coil's 3 dB response was about 4 kHz from center frequency. Now I could attach the amplifier's impedance matching stage, a VMOS FET (VN10KM). It is tied source-to-ground through a 1k ¼W resistor with the common, or cold, end of the coil. The top of the coil is tied to the gate of the FET. Bypass the drain to ground with a capacitor, and power it with a 9V transistor battery. RF output to the receiver is capacitor-coupled from the low impedance source.

I have found that the ferrite rod antenna outperforms most antennas and offers quite a bit of noise immunity. It's also sensitive. It even provided a lot of rejection to a nearby high power, low frequency transmitter operating about 8 kHz lower.

I found a large quantity of the ferrite rods in a local surplus store. If you have trouble finding components for the ferrite antenna, I can get them for you. Write me at the above address. The five ferrite rods and a couple of VN10KM FETs postpaid is $7.

New Test Equipment

Recently I picked up an HP-5360A Computing Counter. It's even more accurate than the HP-5245. Though the counter's maximum frequency is 320 MHz, it shines in that it can resolve frequency to 1 part in 10 to the 10th. As Hewlett Packard states: "This counter can measure the time between two events to a resolution of 100 pico-seconds, about the time it takes light to travel one inch!"

I don't plan to measure light to that degree, but I'm very excited to have the counter. Less than two weeks later, my partner, Kerry N6IZW, also picked up the same type of counter from a different source. These counters are as rare as the proverbial needle in the haystack. They not only offer high resolution, but automatic frequency banding to input signals as well. Their time base is not normally found on available counters.

These counters have great range and auto-ranging. If you put a very low frequency signal, such as 12.xxx Hz, into the counter, it displays 12.123456789 HZ. Then with the same counter connection, shift the input to your 2 meter HT and key the transmitter on 146.52. The counter responds with 146.52000034 MHz, shifting the frequency range indicator from Hz to MHz automatically. Kind of makes you feel like a kid in a candy store with a no-limit credit card. I'll have more on this counter after I've used it a while.

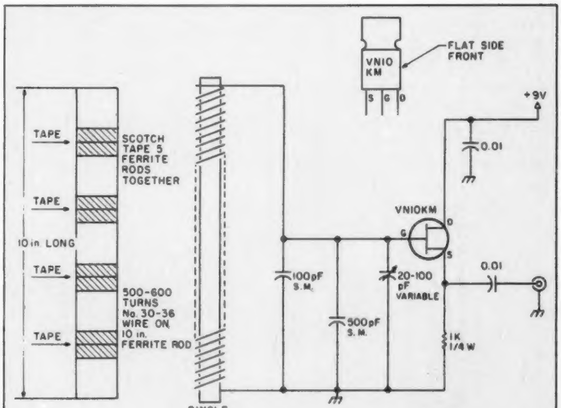
Mailbox Comments

Richard WA6JOX, Ventura County Amateur Radio Club President, is protesting the decision to remove the "New Frontier" column from *QST* magazine. He states that the future of amateur radio may well be in the microwave bands. His main point is: "NO NEW FRONTIERS, NO NEW SUBSCRIPTIONS!" Richard supports his point by taking a look at European and Japanese amateur radio magazines to see how far we are behind in this field. He says that he understands that the ARRL decision was made "for budget reasons, and not due to lack of material or interest."

Mark AG8N writes that he's looking for other interested amateurs in the northern Ohio area to band together, share ideas, and conduct microwave experiments. He's selecting sites for a possible link which would go into downtown Cleveland. Mark's address is 326 Township Road 1080, Polk OH 44866.

Kirk N7CCB has been rebuilding a Ribidium Beam, high accuracy, frequency standard (clock). Quite a project; something I've never had the opportunity to do. The Ribidium and Cesium Beam standards are the top of the line in frequency accuracy. We will report on his project as news develops.

N6IZW and I have been working out designs and PC board layouts for a simple phase-locked loop for



Construction details for the 60 kHz ferrite rod antenna. You can put the finished antenna inside a piece of plastic pipe 1" in diameter with plastic end caps to support and protect the antenna and amplifier. SM=silver-mica capacitor.

Continued on page 52

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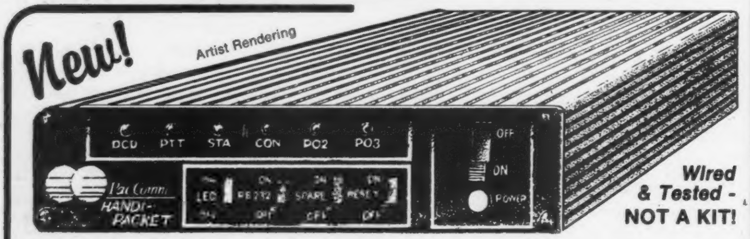

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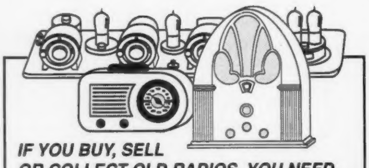

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The art of small talk

HW2P shown actual size.

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BCNU in a New Way

We hams are fond, to say the least, of abbreviations. From DE to 73, from DX to WX, amateurs operating on CW and RTTY have always enjoyed using a string of upper case letters to represent a thought.

One of those strings is BCNU, short for "Be Seeing You," of course, rather figuratively used at the end of many a CW or RTTY QSO. Well, now all that can change. This month, I will begin looking at a way to really allow the fellow at the other end to BCNU, or anything else, for that matter.

If I mention digitizers, to most of you one of two images will crystallize. One is the expensive page scanner, able to convert a page of image into a graphics file. The other is the hand scanner, which is held in the hand to sweep a picture into a computer's memory.

The page scanner is nice, but as I intimated, rather expensive. The hand scanner, at about $200, is more affordable, but it can only scan flat objects about three inches across or so. What we need is a more flexible solution! This month, and next, I shall look at two of them.

Video cameras are no longer a rarity in American homes. With the proliferation of VCRs, camcorders are just a speck behind. That said, let's have a look at a video digitizer, a board that will convert standard video into an image that can be viewed on a computer screen, manipulated, and transmitted over radio or wire circuits.

The VC-1000 Board

As the IBM PC/XT/AT compatible category comprises the bulk of amateur computers, I'll cover two boards, one this month and the other next month, which allow you to import video images to these machines. Selling for about the same cost as hand scanners, they make exciting extensions for the home computer, with applications as diverse as digital RTTY pictures, desktop publishing, or entertainment at your kid's birthday party.

The Video Capture VC-1000 board, by Diamond Flower Electric Instrument Co., (USA) Inc. (DFI), is sold in many computer outlets. Setup is easy—just plug the board into an expansion slot in your computer, and plug an external controller into the board. Video is input to this controller, which features slide controls for brightness and contrast, as well as a switch for dithering vs. line art. Also, you can select the size of the image, within narrow confines.

When installed, the VC-1000 allows input of images from a camera or VCR, monitoring output on a local CRT, and storing them on a PC compatible computer.

Needed Hardware, Supplied Software

The DFI VC-1000 requires a PC compatible with at least 384K memory (640K recommended), MS-DOS version 2.0 or later, one available DMA channel, a free expansion slot, and a graphics display. The board is configurable for Hercules, CGA, EGA, or VGA displays. A mouse is optional, but it makes using the board a lot easier.

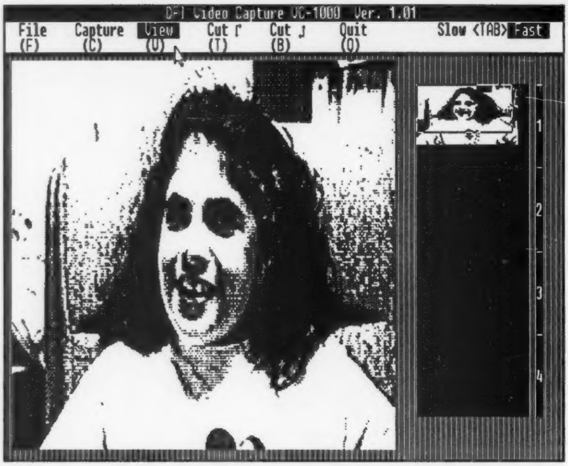

Figure 1. Main Screen for VC-1000 software.

Software supplied with the card lets you view four captured images. These may be different versions of the same image, captured in sequence, or entirely unrelated images. The viewable portion of each scan is a bit smaller than the actual area scanned, represented by a box superimposed over the miniature version of the scan, displayed at the right of the screen. Figure 1 is a sample command screen, featuring an image of my daughter, captured as image number one.

Captured images may be edited in a fat-bit mode, although the display is a bit hard to deal with, as no

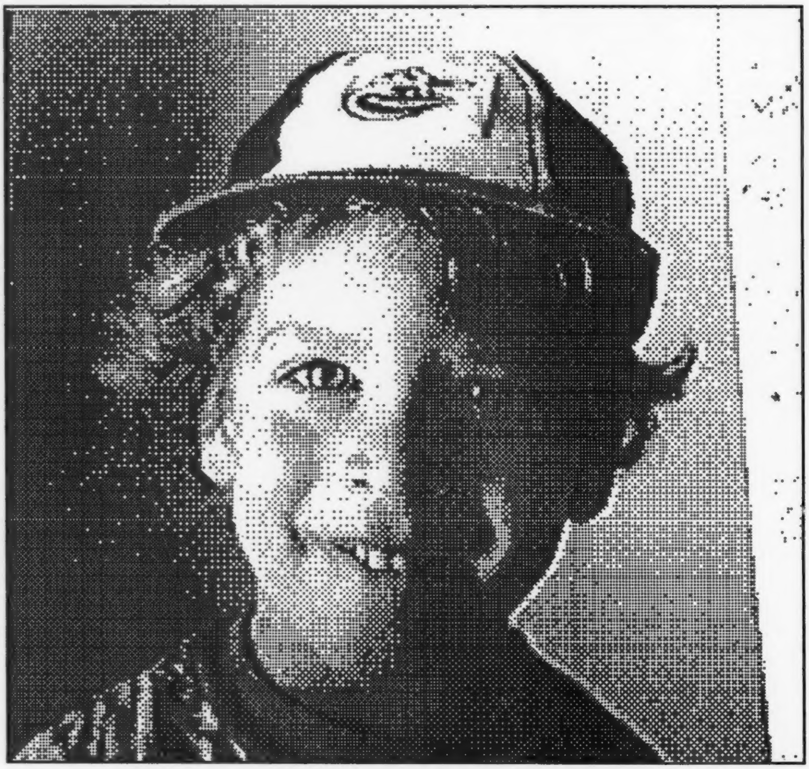

Figure 2. Image at finest dither, setting 2.

Continued on page 52.

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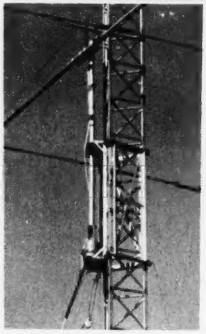

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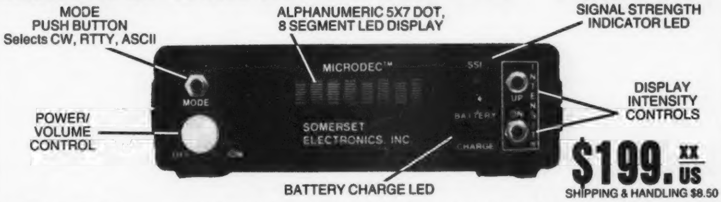
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Space Symposium 1989

This time last year, AMSAT volunteers were getting ready for the launch of four Microsats and beginning to work on the many requirements of the Phase 4 geostationary satellite program. And they're still working.

Photo B. AMSAT Director Dr. Tom Clark W3IWI gets in phase with the Microsat model at the AMSAT Space Symposium.

The Microsats, including two packet radio flying mailboxes, the Weber State College digital picture system, and the DOVE voice-encoder satellite, have experienced launch delays into the early part of 1990. They're ready to go; all they need is a ride into space.

The delays have allowed more time to organize ground-control activities and develop software for communications through the packet satellites, and picture display programs compatible with the Webersat imaging system. A few minor quirks have also been ironed out of the satellites themselves.

Des Moines, Iowa was the location for the 1989 AMSAT General Meeting and Space Symposium. Satellite enthusiasts from the US were joined by many overseas hams. Notable foreign attendees included AMSAT UK Secretary Ron Broadbent G3AAJ, AMSAT Italy V.P. of Engineering Alberto Zagni I2KBD, AMSAT Brazil President Junior Torres de Castro PY2BJO, AMSAT Mexico President Dave Liberman XE1TU and AMSAT-OSCAR-13 ground-control operator Ian Ashley ZL1AOX.

Hosting the event was the Central Iowa Technical Society, with long-time AMSAT supporter Ralph Wallio W0RPK as chairman. The Space Symposium program began at 8 AM Saturday, November 3rd.

Microsats and Phase 4

AMSAT Directors Jan King W3GEY, Dr. Tom Clark W3IWI and Dr. Bob McGwier N4HY joined with previous AMSAT Director Harold Price NK6K to present a complete update on the Microsat program, covering design and construction difficulties.

Stan Sjol W0KP and Bill Clapp presented details on the Microsat operations at Weber State College in Ogden, Utah. Webersat is identical to the packet Microsats for AMSAT NA and AMSAT Argentina, but it also has a height-increasing "penthouse" for additional experiments and the CCD (charge-coupled device) color camera.

Dick Jansson WD4FAB filled out the morning with a status report on the Phase 4 Geostationary hamsat program. A full-size model was built at Weber State College, shipped to Arlington, Texas, and displayed at the ARRL National Convention in June 1989. Progress on the mechanical design continues at a steady pace, but many questions concerning the control systems and radio equipment remain.

Afternoon talks ranged from current activities on A-O-13 to future space missions and even balloon-borne amateur radio television (ATV).

Photo A. WA5ZIB/6 monitoring UoSAT-OSCAR-11 using an HT near the Golden Gate Bridge. Listening to the digital voice encoder on the DOVE Microsat will be at least as easy.

New Projects and New Software

AMSAT V.P. of Operations Courtney Duncan N5BF discussed AMSAT user projects for the future, including thirteen points concerning project management, interfaces to other organizations, techno-sports via satellite, frequency coordination issues and the creation of a Microsat Command Network.

All four of the Microsats were constructed by AMSAT NA, but the satellite ham licenses (like repeater trustees) belong to four separate individuals in three different countries. Four different groups of ground controllers will monitor and control operations onboard the Microsats, but they will need to keep in close contact since the four satellites are extremely similar in design.

Photo C. Bill Brown WB8ELK's micro-balloon experiment included a 2m transmitter with internal batteries and attached ground plane antenna.

Everyone appreciated Franklin Antonio N6NKF's donation of Instant Track to the AMSAT Software Exchange, and the program features brought spontaneous applause during the slide demonstration. Check the November 1989 issue of *73* for a product review, but call AMSAT (301) 589-6062 for information on availability.

Ed Stluka W4QAU described the tethered satellite project, involving the suspension of an amateur-radio package on the end of a long cord or tether from the space shuttle. AMSAT Executive V.P. Dr. John Champa K8OCL, with the Solar Sail Program, presented new concepts, and Preston Carter described Lunar Polar Orbiter possibilities.

SAREX 2

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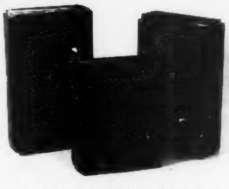

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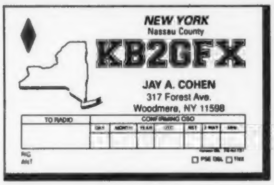

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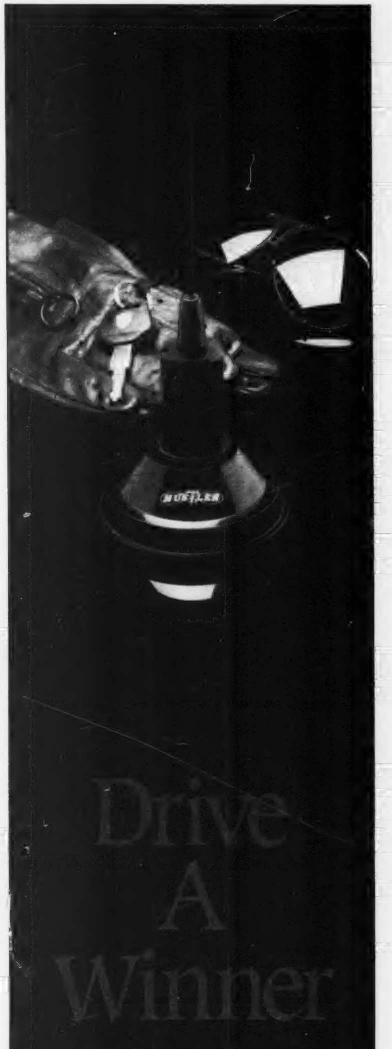

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CIRCLE 269 ON READER SERVICE CARD

Programs Bill Tynan W3XO (also known for his column, "50 MHz and Above," in *QST*) delivered the latest information on the upcoming ham-in-space activities from the space shuttle. In 1990 two hams are scheduled to go into orbit with amateur radio voice, packet and TV activities. Details on missions STS-35 and STS-37 will be forthcoming, but for now, get your 2 meter FM rigs and tracking software ready. Two-way packet connects and slow-scan-television activities will be possible. The astronauts, Ron Parise WA4SIR and Ken Cameron KB5AWP, are excited about promoting amateur radio with their experiments from space.

Imaging Activities and ATV

Jeff Wallach N5ITU explained the increasingly sophisticated methods used by amateurs to receive and display weather-satellite imagery. The picture quality was stunning due to the use of High Resolution Picture Transmission systems now on board satellites like Advanced TIROS. For more data on weather satellites, contact the Dallas Remote Imaging Group (DRIG) BBS at (214) 394–7325.

> **"All four of the Microsats were constructed by AMSAT NA"**

Bill Brown WB8ELK finished the Space Symposium with video tapes of his balloon launches carrying ATV to the edge of space. An image at 133,000 feet clearly showed the earth's curvature.

The Board of Directors Meeting

The AMSAT board meeting, open to all, took two days. The upcoming launch of the Microsats and Phase 4 were discussed. AMSAT spacecraft designers are eager to pursue new programs and projects, but funding is a major concern.

Phase 4, the geostationary hamsat, will require money beyond the abilities of the amateur radio community. Although AMSAT can easily build satellites like the new "cheapsat" under study (2 meters up and 10 meters down), and proceed with altered versions of the Microsats, we know that Phase 4 cannot be built and launched without serious outside commitments.

What do you want? What are you willing to support? Do we need further low-earth-orbit (LEO) satellites with easy-to-use analog transponders? Do we need a larger, more powerful variation of A-O-13? AMSAT DL in West Germany has recently received funding promises from their government for much of this program. Should we join with them to produce part of their system? Let me know! Write to me at the address above.

AMSAT NA would like to progress to geostationary satellites and beyond, using microwave bands and the fantastic volunteer expertise available, but it must have the cash and support to get there.

DOVE

Constructed in Boulder, Colorado, and sponsored by BRAMSAT, DOVE (Digital Orbiting Voice Encoder), is one of the four Microsats which should have been launched in late January, with the two UoSAT spacecrafts on the SPOT-2 mission, on an Ariane 4 rocket from French Guiana.

U-O-9 was capable of transmitting synthesized speech using the National Semiconductor Digitalker chip set. FM deviation on the 145.825 MHz downlink frequency was low, and power output was limited to 350 milliwatts. DOVE will use the same frequency, but it can transmit up to four watts of fully deviated (5 kHz) FM using a more complex speech-synthesis system. It'll be easy to listen to DOVE on an HT. In addition to telemetry data, DOVE will also transmit messages created by students in elementary and secondary schools.

Tape-recorded material will be digitally stored on board the satellite for retransmission around the world. The original tonal qualities and speech inflections will be maintained for true reproduction.

For information on the Project DOVE Teacher's Guide, for teachers wishing to integrate this teaching-tool-in-orbit into the science, social studies and language arts curriculum, contact: Project Dove, %Richard Ensign, AMSAT Science Education Advisor, 421 N. Military, Dearborn MI 48124 USA. ■

Above & Beyond

Continued from page 45

local time base. We'll use this system to phase-lock our brick oscillators for microwave use. I'll have more information on this when we finish the project. We need reference oscillators in the 5 and 10 MHz range. I would be interested in hearing from any of you who might have such oscillators or know of a source for them.

Zack KH6CP/1 states that he hopes we enjoyed the 10 GHz Contest. The weather was lousy at his location. He climbed the Talcott Mountains in Connecticut and couldn't get schedules on 2 meters. He has kept active building an Avantek 10 GHz preamplifier using the ATF-13735 GaAsFET. Test measurements show a noise figure of 6.3 dB using an IC-402 in the IF system.

Larry K1LPS writes that Michael VE2DUB is trying to keep microwave projects going during the winter in the Montreal area. He is working on several 10.7 MHz IF systems and making a coat pocket (small) rig for 10 GHz. His best DX on 10 GHz was 83 miles, using a simple system and a 17 dB horn antenna.

K1LPS Proposes 10 GHz Rule Change

During the 10 GHz Contest, Larry K1LPS writes that the weather in the Northeast "...wreaked havoc both weekends. Some areas of the east were virtually rained out for the entire weekend. Those operators that have participated in past contests mentioned that the poor weather has been the same in prior years."

Larry proposes more flexible scheduling of operating periods. Being able to adjust to local weather conditions will permit greater activity and promote more interest.

Since microwave 10 GHz activity is largely regional, flexible scheduling would allow for rained-out weekends and other problems. Some groups might find it advantageous to schedule days during the VHF/UHF contest weekends.

The ARRL will consider changing the rules only if the majority of participants request it. K1LPS would appreciate your input about the proposal. Contact Larry Filby K1LPS at RFD #2 BOX 125, St. Johnsbury VT 05819.

Thanks for the fine input from all, and as always I will be glad to answer your questions. For a prompt reply please send an SASE with your questions. Best 73s, Chuck WB6IGP. ■

RTTY Loop

Continued from page 48

reference view is given to the enlarged view. Nonetheless, it's better than nothing, and perhaps more useful for cleaning up line type drawings.

Once captured, images may be saved in Microsoft Windows Paint (.MSP), GEM Paint (.IMG), Dr. Halo (.CUT), PC Paintbrush (.PCX), and Pagemaker (.TIF) formats. Conversely, any of these formats can be loaded, and resaved in an alternate form.

I found that images saved as .TIF files could not be loaded into Print Shop Plus, the graphics program that came with my Logitech mouse, despite the fact that PS Plus works only in .TIF mode. However, if I saved the files in .PCX format, the conversion routine that came with PS Plus, PCX2TIF, would successfully convert the images to a workable .TIF format.

I mention this problem because the graphics program that came with the VC-1000, Halo DPE, a special version of Dr. Halo designed to work with the VC-1000, is in my opinion, for all intents and purposes, next to useless. Used to the fine control of as simple a program as PS Plus, I was disappointed by the clumsy interface, limited choices, and non-intuitivity of Halo DPE. After installing the program on my hard drive and playing with it for a while, I just chucked the whole thing, and fell back to PS Plus.

Now, as to the images you can obtain. Figure 2 is a video capture at the highest dither available. For different applications, any one of the three dithers may be used.

Next month, I will look at a different board, similarly priced, to accomplish this task. While this one does not come with graphics software, it is capable of transferring images to other users. Each has its strong points, so there are no clear winners, but I hope to give you enough information to allow many of you to begin playing with digital images.

As always, I welcome your comments, criticisms, and suggestions. Reach me via USPS at the above address, or electronically on CompuServe (ppn 75036,2501) or Delphi (username MARCWA3AJR). After next month, let's all mean it when we say BCNU!...de WA3AJR ■

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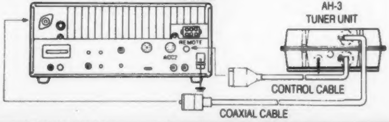
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73 Review

by Steve Roberts N4RVE

The ICOM IC-725

An experiential viewpoint.

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This is not a normal equipment review. There are no lab test results and no objective comparisons between this unit and anything else on the market. My new ICOM 725 did not arrive with a *73* product-review assignment attached, nor have I really given the issue much thought.

What really counts in equipment discussion is the non-analytical impressionistic view that comes from experience, coupled with some commentary on how appropriate a product is for a given set of needs. And it was a specific need that drove my selection of this unit . . . bicycle-mobile HF operation.

Battery Operated Rigs

First, I have to say that no current commercial Japanese all-band HF rig is optimized for low-power operation. The two obvious candidates are the ICOM 725 and the Yaesu 747 (which also appears in slightly modified form as the Heath SB-1400). Both are fine units, but they draw a little over an amp on receive standby—far too high for casual all-night use on battery power. Compared to my old Argonaut 515, this astronomical power drain would have an inhibiting effect on operation.

But life is a tyranny of trade-offs. On this next trip, I want more power, more features, more precision, more operating convenience, and remote operation. For all the pleasure of the old Argonaut (and no, I haven't seen the new model), it's time to move up. But the inevitable cost is more weight, more power drain, and more complexity. Is it worth it?

Yes!

My ICOM 725 is now shock-mounted in the comm bay of the new bicycle trailer. The 725 offers a serial interface port known as CI-V; this is handled by a local New Micros FORTH 68HC11 in communication with the network up in the console. The radio's audio input and output are ported to a crossbar switch that lets me conveniently operate with the Setcom helmet headset, a speaker mike, or through the UHF remote—and it's a simple matter to switch in filters and the like.

Its antenna output is cabled to a coax patch panel through which I can manually select mobile whips, external dipoles, the tuner, or whatever.

Reducing power drain is a little trickier, but I've managed an estimated 60–70% savings in standby current. The dial light is now switched, and the internal audio amp is bypassed in favor of the network. And it turns out that you can switch off the power amplifier when in receive with only a slight penalty in T-R delay. I'm rewiring the otherwise seldom-used TRANSMIT push-button for this purpose.

The ICOM IC-725.

Actually, I may retire the 100 watt power amplifier in the 725. The ICOM engineers thoughtfully made it an easily removable module. The alternative, not available in the US but commonplace in Japan, is a 10 watt amplifier . . . just about perfect for my lifestyle, and MUCH lighter.

725 Operation

So much for the custom installation. Fired up, whether in camp, on the road, or in a host's garage, the 725 is all business and a joy to use. It's a capable general coverage AM receiver as well as a multimode, all-band ham transceiver, and it has let me retire the trusty ICF-2002 digital shortwave I've carried for 16,000 miles. It has 26 memories (two of which work together for split-frequency operation on 10m FM or wherever), and two VFOs.

One of the nicest features is the architecture of the digital side of things, including what ICOM calls the "band stacking registers." (In essence, this makes it easy to wander around the bands and return to where you left off in each one without having to explicitly store the locations in memories. The operating mode is tracked intelligently, defaulting to the normal sideband in each case. Manipulating the data in memories and VFOs is simple enough to quickly become intuitive.

Tuning is very fast, and can occur in steps of 10 Hz, 20 Hz, 50 Hz, 1 kHz, 1 MHz, or by bands. The mechanism is simple—push-buttons labeled kHz, MHz, and band invoke annunciator arrows over the appropriate digits on the display, and turning the dial results in the corresponding tuning rate. All together, this results in real agility in getting around the spectrum, further augmented by three automatic scanning modes and UP/DOWN buttons on the microphone.

Controls

The 725 has RIT, of course, along with an internal 10 dB preamp and 20 dB attennuator (but no RF Gain control). There is also an excellent noise blanker, along with AF GAIN, SQUELCH, MIC GAIN, and RF Power controls.

Missing is fast QSK operation, which I came to appreciate with the Argonaut, though the delay on the semi-break-in keyer is internally adjustable and I haven't experimented with it. More significant is the lack of a passband tuning or similar control, though I rarely encounter QRM situations that can't be resolved with an external audio filter system that includes spatial synthesis. ICOM offers optional plug-in CW filters, with 500 or 250 Hz bandwidth. (I should note that AM and FM transmission require another optional module, though AM reception is standard.)

The IC-725 in Action

My actual performance evaluation is subjective, and is influenced by all the variables that affect any station. Signal reports and comments on audio quality are consistently excellent within the expectations of band conditions. I'm only using a dipole and mobile whip, but I have no trouble with moderately competitive DX.

And the operating experience itself—the feel of controls, the sound, the level of simplicity—are all superb. I've been a guest in a lot of shacks, and the IC-725 holds its own very well despite its small size.

ICOM offers companion automatic tuners (the AH-3 and AT-150) which are fully supported by the rig: just push the TUNER button. Also, the CI-V line makes it completely compatible with previous smart radios from ICOM. I'll be using the NM1D shareware Autolog program to control the radio from one of the DOS machines in the console, while also handling contact logging (or maybe I'll write one in Hypertalk for the Mac).

All in all, I can comfortably recommend this radio to anyone contemplating mobile operation, or anyone looking for a small-footprint rig for a crowded operating space. It seems to weather abuse well . . . since we're in a Santa Cruz layover, it has been extensively earthquake-tested. Indeed, it served as a lifeline to the outside world in the 3 days we were with no power.

Steven K. Roberts N4RVE is currently in a Silicon Valley layover, building the Winnebiko System 3, on which he will take off for open-ended international travel this spring. Detailed system descriptions and other stories appear in his bimonthly Journal of High-tech Nomadness, available for $15 from Nomadic Research Labs, P.O. Box 2390, Santa Cruz CA 95063.

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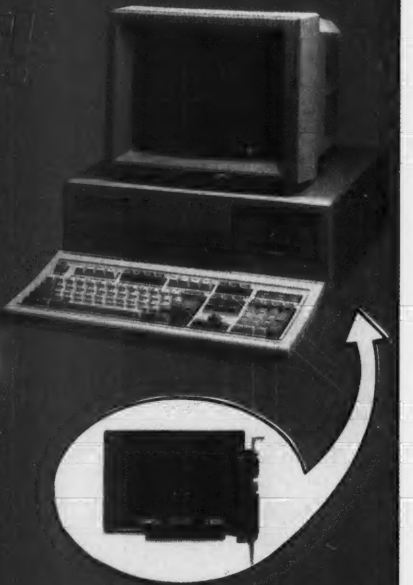

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LETTERS

From the Hamshack

Something for Beginners

After watching a ham operator in action, I decided to look into the hobby. I know absolutely nothing about amateur radio. I picked up your July issue in hopes of learning where to begin.

The one theme I understood was that the ranks of ham operators is dwindling and the hobby needs newcomers. But in this issue, I found the newcomer ignored. Nothing on how to get started, no simple explanations about equipment or license requirements.

I realize this level would be boring to your experienced operators, but surely a page or two devoted to the beginner is reasonable—or even a continuously running offer for free or low-cost reprints of such material.

How many people like myself might have picked up an issue with the idea of becoming a ham, only to become discouraged?

William E. Hugger
Essexville MI

Thanks for your letter—and yes, we don't have much for beginners. You wouldn't either if you were publishing. With ham growth at 0.8% in the last year, there are very few newcomers. If I publish stuff for beginners, I get hate mail and subscription cancellations from the old timers. And I hardly get any new readers, since there are so few beginners.

A few years ago, Ham Radio *started a new magazine for ham beginners. It went broke. There's a lesson there.*

In 1963 the ARRL almost totally destroyed the high school radio club infrastructure which kept us growing, so we've had little growth since then. And without those radio clubs, not much hope of growth. . . .

Wayne W2NSD/1

William, see the November "Welcome Newcomers" for books, and look over the ads we carry for Novice courses. . . KA1UKM

Full Cycle?

Wayne's editorial in the last September issue seemed to accept and expound the theory that 60 cycle electromagnetic emanations from house wiring and appliances causes cancer and other disorders. It reminded me of an article published in *73*, "Electronic Health," by C.A. Moore, in the May 1971 issue, which boldly claimed in no uncertain terms that an apparatus constructed of a neon-sign transformer and a spark gap would *cure* cancer, "severe toothache and other pains," and generally "revitalize cells." If constructed and used per the article's directions, the apparatus would give the user a much stronger dose of 60 cycle and higher frequency emanation than "killer" electric blankets or video terminals! I guess it can't be said that *73* doesn't give space to both sides of a controversial issue.

Ron Johnson WA5RON
Austin TX

Delighted you remembered the article—I'd forgotten about it. Of course, the article doesn't say what you say it does. You're just trying to get my well-tethered goat. But the article certainly seems on target as far as pointing out that cells are electrical and seem to be affected by AC currents: The reasoning seems logical that AC magnetic fields may be able to help as well as harm cellular reproduction. It's certainly timely to get some experimenting done. I wish more readers had paid attention to the '71 article. The spark oscillator is primitive. We'd want to have close control over the frequency and field strengths, and experiment first on things like chick embryos before we start zapping humans.

But the idea that this might help things like skin cancer isn't that far afield. Something is going wrong with the cells, triggered by a growing number of agents of which we are aware, such as magnetic fields, smoking, UV, etc., all plus a necessary psychological component. . . Wayne.

Make Contact—Please Don't Disregard Us

I wish to praise KA1UKM for the splendid reply she made to WB2DSH in the November 1989 issue of *73*. I have lived in Botswana (2 years) and I have traveled extensively in South Africa. I moved to Liberia last summer. Several governments here in Africa do not live up to our ideals. It is too bad WB2DSH has set up the American media as his savior of Africa. Many news people come out here and have their copy all written, but just need some incidents to spice it up a bit. Much suffering for my brothers and sisters has resulted from these manipulated reports.

Kind words and gentle pressure in a contact will move more mountains (racism) than all the "blasting" out of a person will ever accomplish. Over here, many white folk are working with black Africans to make the continent better. Changes are coming. Please don't "throw out the baby with the bath water."

Dale McMindes
Monrovia, Liberia
West Africa

Unfair Coverage

After reading your [Linda KA1UKM's] November "Welcome Newcomers," I was wondering why our Radio School Novice class courses were not mentioned. Please don't leave us out of further editorials—even

Taipei, Taiwan. In the middle row, on the righthand rack, old 73s wait for new homes.

though you may be mentioning products only because you sell them. You may be selling beginners short on the tremendous number of well-prepared study guides, as well as computer courses. If you're truly going to cover the newcomer's scene, do more than read over your inventory on Mr. Wayne's bookshelf.

Gordon West WB6NOA
Costa Mesa CA

Gordon, I know your courses are excellent, but my goal was to inform people about the books we have on hand which I like. This was my idea—in response to calls and letters from readers asking about the books we have available—and I did NOT write it as a sales pitch. I wrote it to inform, and share my enthusiasm. Also, my intent was not to cover all the best courses available. Had I done so, with only one page to fill, I could only have made a list, with no descriptions. That would have been no better than the tiny, barely informative blurb in the Bookshelf. . . Linda KA1UKM

CW, A Valuable International Language

We believe those who do not use code are missing a crucial opportunity for the promotion of international goodwill. CW is the choice of many nonEnglish-speaking hams, not only because of propagation, but because some foreign hams cannot obtain SSB equipment.

CW is an international language, *even more than English*. Its abbreviations and conventions allow meaningful communication; cut down misspellings and mispronunciations, and help maintain correct word order. Since CW is slower than voice, the nonnative speaker can spend more time understanding the message and formulating a response.

Amateurs are working hard to bridge the language barrier. Len W6HJK has compiled "Russian Phrases for Amateur Radio." Goh N6UOK is preparing a syllabus of Japanese phrases. For those who know a foreign language, CW will remain a viable mode. For those just starting, CW can be vital. We are not necessarily promoting a *law* requiring CW for licensure, but we do believe in the *principle* that CW is profoundly valuable.

Goh Kawai N6UOK
Dept. of Linguistics
Stanford University, Mountain View
CA
Len Traubman W6HJK
San Mateo CA

They Get Around

Have you ever wondered where old copies of *73* go to die? Well, I found the place. . . Taipei, Taiwan. Some copies up to a year old were reselling for $5–8 US at the Brother Hotel in downtown Taipei.

Peter Bealo WB2MJG
Plaistow NH

Meaningful Conversations?

In line with your campaign to clean up ham radio, I offer the following comments. I hope you'll accept them in the spirit with which they're written!

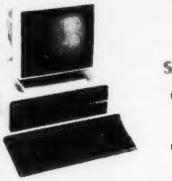
As you know, our on-the-air conversations typically could be generated and responded to by computer. In fact, some hams I suspect of being silent keys long ago, for their conversations never vary. But it turns out that restoring meaning to radio conversation would spell the END OF AMATEUR RADIO!

Yessir, it's there in the regulations: Only conversations which by reason of their unimportance are not considered fit to spend telephone fees on may be exchanged!

Obviously, our brethren in radio are not deliberately boring us with the same old information, neither are they so unintelligent that only the same old phrases fall from their lips. No. They are conscientious, rule-abiding operators who are meticulously following the letter of the law.

Instead of castigating them, you should be congratulating them! Such attention to detail protects our hobby and keeps our frequencies from being taken for meaningful purposes.

Cortland E. "Rich" Richmond KA5S



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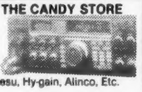

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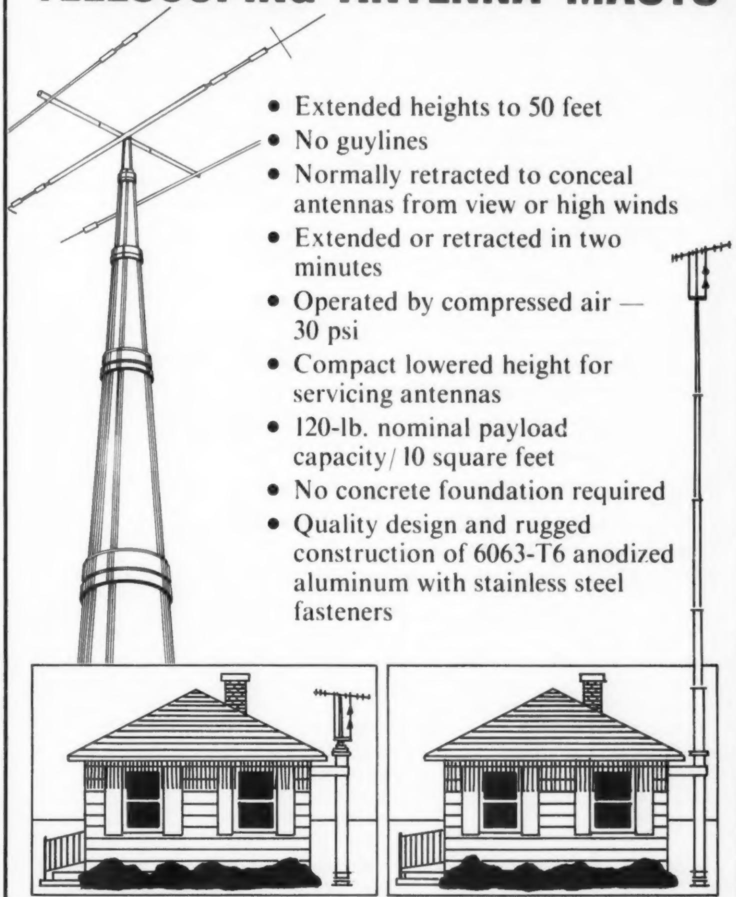

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Better Frequency Coordination Needed!

My call is going home to California. By the time you read this, I will have moved from the Washington, DC, area to the San Francisco Bay area.

In many ways, it's easy to operate packet radio in the Washington, DC, area. Users have plenty of frequencies on 2 meters to choose from. The Mid Atlantic Repeater Council (TMARC, the local frequency coordinating committee) took an active interest early on and saw to it that there were plenty of frequencies available for packet radio operation. (In addition to 145.01–145.09 MHz, TMARC legitimized the use of 145.51–145.69 MHz for packet.) Those responsible for building and maintaining BBSs, digipeaters, NET/ROM nodes, and IP switches assisted by using 220 and 440 MHz, and the 6 meter, band liberally and effectively. This kept congestion, hidden terminals, and frequency use arguments to a minimum.

This apparently is an unusual case. Many hams who live in large metropolitan areas complain about the lack of available frequencies for packet operation. It seems that most frequency coordinating groups pay little or no attention to packet radio, probably due to a bias toward repeater operation (most of these coordinating groups grew out of a need to coordinate the use of repeater frequencies) and a lack of knowledge about packet radio. The solution is for packeteers to get involved in the frequency coordination process.

More Channels for Packet

Frequency coordinators need to understand that their decisions strongly affect other users of amateur radio besides the repeater users and operators. They need to know that packet radio's requirement for frequency coordination is different, but no less vital to amateur radio.

Yes, packet users can share a channel, but the number of users on one frequency at any one time is limited. Not everyone can be crammed onto 145.01 MHz and forgotten. Packeteers need solutions: either the allocation of more frequencies, or frequency coordination so they may use the frequencies they have more efficiently.

Packet On 2m

How is this most popular VHF spectrum split up? There are three major user groups who, because of the nature of their activity, cannot easily share their frequencies. These are the repeater users, the hamsat (OSCAR) users, and the weak-signal enthusiasts.

Repeater users concentrate in 144.51–144.89 MHz, 145.11–145.49 MHz, 146.00–146.40 MHz, 146.60–147.40 MHz, and 147.60–148.00 MHz. Satellite and space communications use 145.80–146.00 MHz. Weak signal operation generally takes place on and around 144.150–144.250 MHz. 144.000–144.100 MHz is reserved for CW operation.

Packet operation in the satellite subband and the weak signal part of 2 meters can be very disruptive. A satellite is essentially a flying repeater; any signal within its passband gets repeated on another band (usually 10 meters or 70 cm, in the current crop of satellites) and in many cases, you can hear their signals over large areas of the Earth. Unless you know for sure that there is no "bird" above the horizon with its 2 meter input enabled, don't use 145.800–146.000 MHz.

The weak signal enthusiasts occupy a very small part of 2 meters, but they are very sensitive to ANY emission in their part of the spectrum. They spend a great deal of time experimenting with propagation, and they examine any signal. Packet racket can raise havoc when you are trying to receive a signal that is only a few decibels above the noise floor.

Plenty of Room for Packet?

Gosh, it seems like all of 2 meters is used up, right? Wrong! The above only represents 2.760 MHz of 2 meters. 1.240 MHz are left for simplex voice and packet. This means that almost a third of the 2 meter spectrum is potentially available for packet operation, not just the 100 kHz from 145.00–145.10 MHz.

Start using this spectrum. No person or group "owns" a frequency. Do be courteous, but don't be shy. Packet radio uses Carrier Sense Multiple Access (CSMA); you can share the frequency with other users. Take advantage of that capability.

Before you begin to transmit on a frequency, find out whether it's in regular and general use. One of the simplest methods consists of putting a receiver on the frequency, and using the squelch line or a VOX to start a stereo tape recorder. Use one channel to record the audio from the receiver tuned to the frequency, and the other channel to record the audio from a receiver tuned to WWV. This way you can find out who is actually using the frequency, and when.

The repeater portion of the 2 meter band is not sacrosanct. Many allocated repeater pairs are little, if ever, used. Check with the local coordinating council to see what channels are and aren't spoken for. Use the monitoring technique mentioned above to locate unused repeater frequencies. You might also find repeaters seldom used and come to an agreement with the owners on packet use of the repeaters. A properly adjusted repeater is a MUCH better choice for packet operation than a simplex digipeater.

Plenty of spectrum is available on 2 meters for packet radio operation. You just have to look for it. Spend time "mining" the spectrum, and you may just find a few more frequency "nuggets."

Modems and Spectrum Efficiency

Most packet operation takes place at 1200 bauds using Bell 202 modems to modulate a narrowband FM transceiver. This is very inefficient; the packet signal occupies 15 kHz or more of bandwidth. Using an SSB transceiver instead of an FM transceiver is a possible improvement, but the Bell 202 modulation scheme (FSK with a 1 kHz shift using 1200 and 2200 Hz tones) generates a signal that will not pass through the average SSB transceiver without unacceptable distortion. One simple solution—change the shift.

There is no need to use a 1 kHz shift. With FSK, shifts as low as half the data rate (600 Hz for 1200 bauds) can be used. The question is how to do this using current TNCs. As it turns out, most TNCs support a different modem standard, V.23, that uses an 800 Hz shift. Instead of 1200 Hz and 2200 Hz tones, V.23 uses 1300 Hz and 2100 Hz. The spectrum for V.23 spans from about 700 Hz to about 2700 Hz. Compare this to the Bell 202 whose spectrum spans from about 600 Hz to 2800 Hz. Most SSB transceivers can pass a signal that is 2 kHz wide, but they have trouble with signals any wider.

Advantages of V.23

1. The overall bandwidth of the signal is about 2 kHz, seven times less than a Bell 202 modem driving a NBFM transceiver. Now you can get 25–35 packet channels into the space formerly occupied by only five channels.
2. The different modulation scheme buys you 10 dB or more link margin improvement. This means that you can use 1 watt of SSB signal to do the work of 10 watts of FM signal. Looked at another way, this means your 10 watt SSB rig will do the work of a 100 watt FM rig.
3. This is an ideal way to do 1200 bauds on 10 meters using inexpensive 10 meter SSB transceivers. Novices can use this scheme effectively and inexpensively to get on 1200 baud packet. (The little $260, 25 watt, 10 meter transceiver from Radio Shack might work very well, and the price is much less than a new 2 meter FM rig. I'll experiment with this and give you a report in a later column.)
4. Most TNCs can operate their modems as V.23 devices with little or no modification.

Most TNCs Will Support V.23

If you have a Kantronics TNC, you're in luck. Most Kantronics TNCs can operate in V.23 mode simply by entering the command CCITT ON. TNCs with the AMD7910 or the TCM3105 single chip modems can operate V.23, as control pins on the chips select the modem's operating mode. If your TNC has one of these modems, but no command to select V.23, contact the manufacturer for modification information.

By modifying the transmit modulator, TAPR TNC-1 and TNC-2 clones (those that use the 2206 modulator and 2211 demodulator) can operate in V.23. Use the standard calibration technique to set the transmit modulator to the 1300 Hz and 2100 Hz tones. The receiver demodulator does not need recalibration. That's all there is to it.

You can also modify the AEA PK-232 to operate as a V.23 modem simply by readjusting the 2206 modulator. See the PK-232 manual, or contact AEA for instructions on how to do this.

Proper Passband Adjustment

There is one fly in the ointment; not all SSB radios have a passband centered at 1700 Hz. You can find out if yours does by doing a simple test using only an audio generator and a wattmeter/dummy load. Connect the audio generator to the microphone jack and the wattmeter/dummy load to the antenna jack. Set the mike gain control to its normal operating position. Set the frequency of the audio generator to about 1500 Hz and increase the signal from the audio generator until the transceiver is putting out about half power. Decrease the frequency of the audio generator until the transceiver output power drops to one-fourth of the previous power level (down by 6 dB).

The audio generator is now set to the low frequency edge of the passband. Now increase the frequency of the audio generator. The power output of the radio will rise again. Continue to increase the frequency of the audio generator until the power output again drops by 6 db (one-fourth power). The audio generator is now set to the high frequency edge of the passband. You can now determine how well the modem signal will fit into the passband.

If the modem spectrum does not fit comfortably in the passband, and your transceiver has IF shift, you are in luck; just use the IF shift to center the IF passband over the modem tones. If you do not have IF shift, you'll have to either modify the radio (change the BFO injection frequency) or use different tones.

It turns out that using different tones is not a problem. The only important thing is that the tones differ by the correct shift, in this case, 800 Hz. If you have a TNC-1, TNC-2, or other TNC that uses a 2206 modulator and a 2211 demodulator, all you have to do is readjust the 2206 to the new tone pair. Adjust the 2211 center frequency to be exactly in the middle of the new tone pair, e.g., if the tones are 1000 Hz and 1800 Hz, adjust the 2211 to a center frequency of 1400 Hz.

Please try this and let me know how things work out. I will also be experimenting to see what works and what doesn't, and I'll report back on this in a later column.

The ARRL HF Modem Project

The Federal Emergency Management Agency (FEMA) and the ARRL Technology fund have provided a total of $16,000 for HF modem experimentation. The fund will help defray the costs incurred by amateurs while they are developing and experimenting with new modem hardware.

If you are a serious experimenter interested in spending time developing and testing new modem ideas for HF packet communications, contact Lori Weinberg, 203-666-1541, at ARRL Headquarters, 225 Main Street, Newington CT 06111.

Number 34 on your Feedback card

UPDATES

KB1UM's Flavorig

Refer to "Flavorig!," by Michael J. Geier KB1UM, on page 12 in the November 1989 issue. The Parts List for this project is on page 88. The correct Source and No. for L6 (10 mH) is Digi-Key M70103 (NOT M7100).

Easy Tuning for the Uniden HR-2510

Also in the November 1989 issue, a connection was left out of the diagram on page 40 of the article, "Easy Tuning for the Uniden HR-2510," by Carl A. Kollar K3JML. Pins 2 and 4, and pins 8 and 12, should be jumpered together or the circuit won't work. Otherwise, the schematic, parts placement, parts list, and component mounting guide are all correct.

About Updates

If you have any questions about an article, please contact the author, whose name and address appears at the end of the article. If any changes, corrections, or additional information concerning any item in the article needs to be published, it's the author's responsibility to contact *73* and provide the editorial staff with the new information.

"Updates" is not limited to corrections. For example, if you find a better supplier of a particular part than the author, or an easier way of carrying out his instructions than he suggests, let him and us know.

Material published in "Updates" always refers to items in previous issues.

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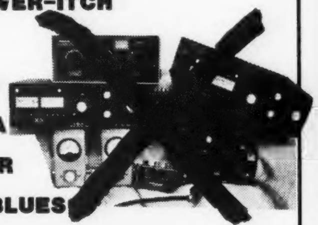

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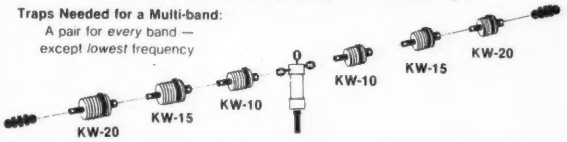

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73 Book Review

by Andy MacAllister WA5ZIB

Tune in on Telephone Calls

For the casual listener and the ardent enthusiast.

Tune in on Telephone Calls
Scanner and Shortwave Frequency Directory
by Tom Kneitel K2AES
CRB Research Books, Inc.
PO Box 56
Commack NY 11725
$12.95 ($2.00 S & H)
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ISBN: 0-939780-08-9

Radiotelephone signals abound from just above the AM broadcast band through the microwave spectrum. *Tune In on Telephone Calls* by Tom Kneitel K2AES delivers a detailed examination of the modes, frequencies and purposes of the many types of wireless phone systems on the air today.

Tom has been actively writing for the amateur radio enthusiast and shortwave listener for over 30 years, and he has published many books and hundreds of articles on communications topics.

Tune in on Telephone Calls is formatted as a frequency list, with detailed descriptions of each service and its location in the RF spectrum. The author also provides a few definitions of terms that might not be familiar to beginners. Unlike other guides Tom has put together over the years, which are composed almost entirely of channel listings, this radiotelephone book is more than a third text.

Communications Privacy Covered

The first chapter gives some of the history of mobile telephone use and the legalities of monitoring calls heard over the air. Unlike the ham on a 2 meter repeater, a radio-telephone user, especially a new cellular subscriber, thinks he is on a clear channel with no eavesdroppers.

Anything said over normal phone lines, from casual business operations to clandestine activities, will turn up on the radiotelephone frequencies.

Tom describes in detail the events leading up to the passage of the Electronic Communications Privacy Act. This law makes it is illegal to listen to cellular mobile telephone (CMT) services.

CMT Overview

Although the chapter dealing specifically with cellular phone operation is short, it is informative. There is complete frequency information, including system input and output frequencies with channel spacing.

If you're interested in technical details on CMT control frequencies or command formats, don't look here. The book does not go beyond the basics, but it does provide a simplified description of the cellular-radio concept in operation.

Section for SWLers

The book has a fine section on shortwave receivers and VHF/UHF scanners for monitoring radiotelephone frequencies. Tom even provides instructions for modifying the Radio Shack PRO-2004 scanner to restore its ability to receive frequencies in the 825 to 845 and 870 to 890 MHz range.

He discusses antennas and the use of receive converters for extending the frequency coverage of older scanners.

Services and Frequencies

Subsequent chapters cover twenty other types of radiotelephone services and their frequencies. From cordless phone frequencies to military aircraft VIP telephone operations, the reporting is very accurate, with a few exceptions.

Amateur VHF and UHF frequency listings, where phone autopatches are allowed, are incomplete. The section on satellite telephone calls is quite short, without any details on what it takes to listen in. Tom does, however, give information on sources the reader may pursue to ferret out more data on these services.

Tune in on Telephone Calls provides all the basic information for the casual listener to get started with radio-telephone monitoring, and many details for the ardent enthusiast. This book is recommended reading for both. 73

Andy MacAllister WA5ZIB is 73's Hamsats columnist. You may write him at 14714 Knightsway Drive, Houston TX 77083.

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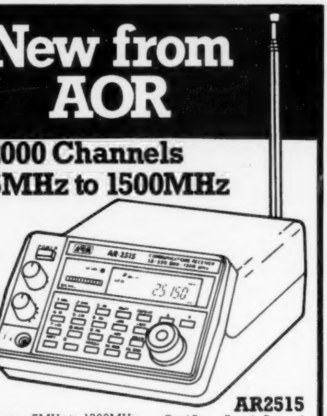

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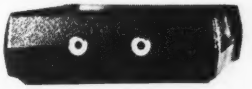

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From the response I receive to "Homing In," I know that foxhunting fun is part of the activities of many ham clubs worldwide. Kathy Allison KA1RWY of the Middlesex Amateur Radio Society of Portland, Connecticut, writes, "T-hunts have helped bring our radio club closer together." Jon Van Allen WB7OWL of West Jordan, Utah, says, "I want to see more T-hunts in Utah. I can't have any more fun without going to jail!"

I'm always interested to hear how different groups set up their RDF contests. Hunt rules around the country are varied and innovative. Some clubs hunt on repeater inputs, others use simplex channels. There are time hunts and mileage hunts, foot hunts and mobile hunts, beginner hunts and advanced hunts.

To learn more about T-hunting practices across the country, I started sending a survey form to column respondents some months ago. Several surveys have come back, and they are great reading. I'd like to know about hunts in your area, too. Please drop a line and let me know who, as a knowledgeable hunt leader, can best answer the survey questions. (You, perhaps?)

Both large and small clubs are catching T-hunt fever. For example, the Lakes Area Amateur Radio Association of Bolivar, Missouri, holds a weekly hunt on 146.52 MHz. Gary Harrison WA0RWS says the hunt starts in the parking lot of a local market on Sunday at 2 PM. The hider transmits 10 seconds out of each minute. According to my almanac, Polk County (the hunt boundary area) has a population of less than 20,000, so having a well-attended weekly hunt there is quite an accomplishment.

First the T, then Tea

Foxhunting is a worldwide ham radio sport. Over in England, Richard Morrall G8ZHA reports on 2 meter hunts in Walsall, near Birmingham. Doppler RDF units are popular there.

The majority of G-land hunts, however, use 160 and 80 meters, as they have for many years. Participants build various kinds of loops and ferrite rod antennas for foot and vehicle pursuit.

A well-established schedule of regional and national championship RDF contests takes place yearly in England. Hunts on low frequency bands mean long hiding antennas. Sometimes the hiders carry this to extremes, and the competitors find themselves inside the antenna system.

A good example is the two-transmitter event held last spring at Banbury, about 65 miles northwest of London. The first transmitter was 8.7 miles northeast of the start point in a thorny hedge near one bank of a deep, water-filled drainage ditch. The antenna was a 300-foot wire along both banks. This made it very difficult for the hunters to figure out which side of the ditch to search for the transmitter location.

Photo A. Foxhunting fascinates kids. Christie Holoubek K0IU demonstrates the art of sniffing at a Youth Science Center event.

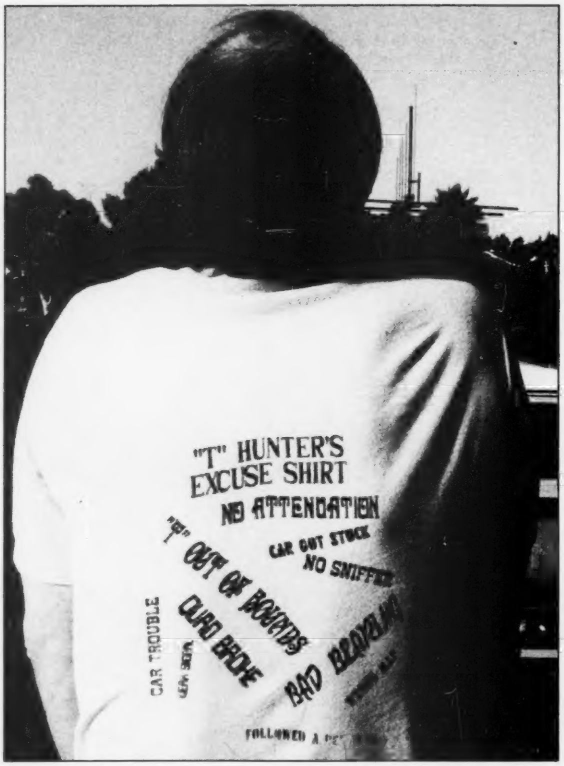

Photo B. When you don't win the hunt, you need a good excuse. J. Scott Bovitz N6MI is modeling the T-hunter's Excuse Shirt.

The second transmitter was 8.4 miles away from the start in the opposite direction. It was in a very large thorn bush next to a stream. The only way hunters could get to the transmitter was to pick their way through a swamp, and then jump the stream. The hiders strung 400 feet of antenna wire across a nearby valley, zigzagged back and forth to saturate that area with signal.

Child's Play

I can hear some of you saying that T-hunters are just adults who never stopped playing hide-and-seek. Could be. But that also means kids will get a big charge out of playing hide-and-seek with radio gear. Hey, that's another way to interest kids in ham radio! It works, too.

The Fullerton Radio Club put a hidden 2 meter transmitter on the grounds of the local Youth Science Center's annual Hobby Fair (see Photo A). Kids of all ages got to ferret it out with a variety of gear, from simple shielded HTs to commercial homing units. They loved it, and several came back later, bringing their friends.

Giga-Hunts Next?

Some clubs find that there is not enough interest to support monthly hunts with the same set of rules. When that happens, try some special event hunts. Dave Knight KA1DT reports that the 200-member Nashua Area Amateur Radio Club of New Hampshire has gotten about 15 teams to participate in each of its half-dozen 2 meter "Super-Hunts."

Every Super-Hunt has different rules. The first one featured two foxes. One used a beam pointing into a metal building for lots of reflections. The second was 3.5 miles away from the first, at a picnic area for post-hunt refreshments. Transmitters came on only when a hunter made a request.

The second Super-Hunt was a walking-only hunt, held in a large park. The transmitter, concealed in a metal 50-caliber ammo box, was so low-powered that it could not be detected at the starting point, requiring a bit of hiking just to be able to hear the signal. This

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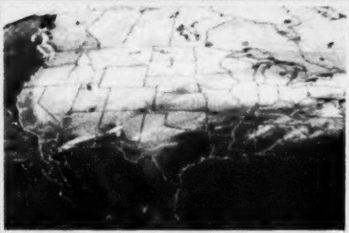

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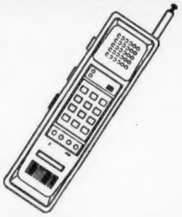

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Homing In

Continued from page 62

brought an element of chance into the hunt, giving less experienced hunters an opportunity to beat the "old hands."

A picnic or other social event follows each Super-Hunt. Sponsors make sure that a program on RDF techniques is presented at the club meeting before each Super-Hunt, to help generate interest and encourage beginners. They show sophisticated setups, but they also demonstrate how to sniff out the bunny on foot with nothing more than a handie-talkie wrapped in aluminum foil. Non-hams and almost-hams sometimes come out to hunt, too.

I'm going to give the foil-wrap idea a try. It should work fine for hand-held sniffing, provided that the transmitter is running very low power. (KA1DT used a 50 microwatt rig on one hunt.) The Nashua hunters make simple variable attenuators for this system by sliding the foil shield up and down the HT's rubber duckie. Don't short out your battery pack!

An award ceremony with simple prizes caps off each Super-Hunt. There's even an "8-ball Award," given with tongue in cheek to the hunter who strays farthest in his pursuit of the foxes.

Poker on the Green

The Victor Valley Amateur Radio Club knows the value of special event hunts, too. Walt Brackmann WA6SJA told me about VVARC's first "Mega-Hunt" and Poker Run last November, featuring five transmitters spaced over an area of 335 square miles. It was slow going because each transmitter came on for only 30 seconds every 10 minutes. When a hunter found a transmitter, he received an envelope containing a playing card and a clue. On the outside of the envelope was the frequency of the next transmitter.

Hunters were to leave their envelopes unopened for the poker hand contest at the end of the hunt, but if they got stuck, they could open the envelope and read the clue. Opening the envelope meant forfeiting the points for that transmitter, but the clue would help the hunter stay in the poker hand competition.

Hunters from as far away as Los Angeles county came to participate in the first Mega-Hunt. Victorville and the rest of the Victor Valley is a high growth area in the California desert. Ham radio activity is mushrooming there, and I hope there will be more Mega-Hunts.

California Commandos

The greater Los Angeles area continues to lead the nation in T-hunt activity. There are 14 regularly scheduled hunts each month, with starting points from Santa Barbara to Escondido. Every month there is some type of "All Day" or "All Night" hunt, with no boundaries and almost no rules.

J. Scott Bovitz N6MI (see Photo B) and Milt Ronney WA6FAT set a new distance record last July when they hid the 2 meter All-Day hunt transmitter on top of 8351-foot Shuteye Peak in the Sierra National Forest.

Their Madera County location was 252 air miles from the Rancho Palos Verdes starting point. Only two of the eleven starting teams found Scott and Ron without assistance. The winning team, Clarke Harris WB6ADC and Jensen Woods WB6ZFU, got there in 24 hours with 423 elapsed miles.

T-Hunting Hazard

Hunts normally go smoothly in laid-back southern California, but occasionally there are big surprises. Miles Abernathy N5KOB passes on this item from the Circle City Communicator, the newsletter of the Corona-Norco Amateur Radio Club:

"N6SBU was stopped along the way to take a bearing on the hidden T, when much to his amazement, a big, ugly homeowner came out to John's car, grabbed his T-hunting quad, and said, 'You get out of here! If you come back, I'll kill you!' In his rapid escape, N6SBU lost his quad, but once his pulse rate dropped from 345 to about 150, he continued the hunt with just his ⅝-wave whip. To his credit, he found hider W6TKV first (best time, but not winning mileage). Now that's a dedicated T-hunter!"

Oops, I'm out of space for this month. Too bad, because there's lots more to tell about amateur radio transmitter hunting. I hope you have gotten some good ideas for hunts in your area.

Thanks to everyone who has provided information for this month's column. I welcome your cards, letters, and T-hunt photos. It's also fun to get club bulletins containing T-hunt reports. Let's show everyone that the fun of T-hunting is the best kept secret in ham radio, but let's not keep it a secret. ■

Continued from page 30

ance was markedly better than with the radio and whip. The tripod added just one extra pound of weight to the hike up the hill.

Accessories

This radio has jacks to connect an external speaker and an electret microphone with push-to-talk switching. There is also an internal noise blanker. I tested it, and it was very effective on ignition noise. Additionally, the receiver has a switch that can be controlled externally to reduce the sensitivity on very strong signals.

On difficult contacts, the radio can be switched to CW. If you didn't bring a key you can use the momentary CW key switch on the top of the radio for CW operation. The PTT switch has to be continuously depressed when using the built-in CW switch. (Switch from SSB to CW on the bottom of the radio.)

To change to another frequency range you must replace the VXO crystal. The AEA manual states that crystals cost $15 each; contact them for details. I determined that the crystal frequency was 12.95883 MHz for 50.150, or channel "A," operation, and 12.99216 MHz for channel "B" operation on 50.250 MHz. The 12 MHz crystal frequency is tripled to the 38 MHz range for injection into the mixer. To determine crystal frequencies use the following formula: Frequency operation (high side) minus IF Frequency (11.2735 MHz), divided by 3 equals the crystal frequency. The VXO circuitry pulls the crystal lower in frequency for the 50 kHz band coverage per crystal.

Grumbles

I have a few recommendations to improve the unit. Make the PTT larger, so your thumb can find it faster, and keep it depressed comfortably for longer periods (since its spring resistance would be spread out over a larger base). Also, consolidate the controls on the same panel, or at least move them and the power jack off the bottom panel so you can place the unit upright. Another solution is to include an antenna with a swivel joint located near the connector, so you can lay the unit on its back panel. Finally, make available a 120 VAC/12 VDC to 9 VDC supply matched to the unit.

Tests

The receiver sensitivity, measured at 0.2μ, far exceeds the specified 0.5 microvolts, and the power output was 1 Watt RMS (almost 2 W PEP) on SSB.

Conclusion

I enjoyed using the MX-6S SSB and recommend it to anyone interested in working this fascinating band. It's not just a monitor to watch for six meter openings, but also a full SSB transceiver to use on those openings you might otherwise miss. AEA had a good idea in providing this SSB HT to a market that is short on SSB handhelds! ■

C. L. Houghton WB6IGP writes 73's "Above and Beyond" column. Contact him c/o the San Diego Microwave Group, 6345 Badger Lake, San Diego CA 92119.

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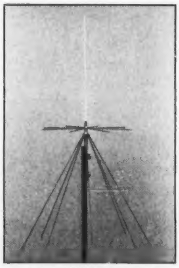
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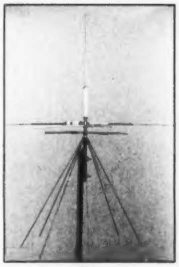
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So get busy. Blow the dust off, check everything out, make sure it still works right and maybe you can help make a ham newcomer or retired old timer happy with that rig you're not using now. Or you might get busy on your computer and put together a list of small gear/parts to send to those interested?

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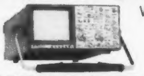

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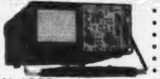

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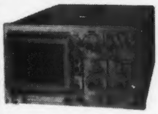

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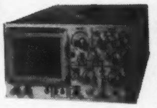

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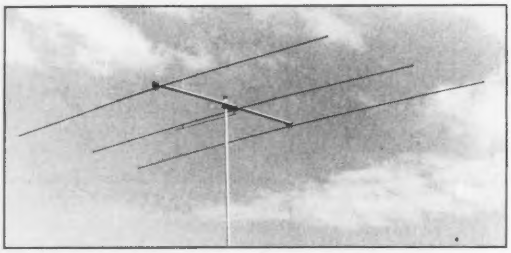

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Detailed instructions and precision manufactured components make assembly quick and easy. All tubing is heavy-wall, hard-drawn, bright finish aluminum.

The Ten-3 is available from amateur radio dealers worldwide. List price: $125. Contact *Cushcraft Corporation, P.O. Box 4680, 48 Perimeter Rd., Manchester NH 03108. (603) 627-7877.* Or circle Reader Service No. 201.

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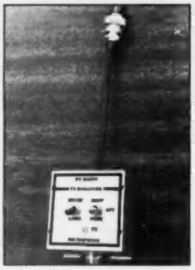
Bird is offering the Model 4410A portable THRULINE® RF Directional Wattmeter with seven power ranges per element, and an accuracy of ±5%. Standard elements provide frequency ranges from 0.2–2300 MHz and power ranges from 0.002–10,000 watts; special elements provide measurements at frequencies as low as 50 kHz. It's ideal for field-service work, laboratories, and any application which requires accurate measurements at mW, W, or kW, quickly and economically. The 4410A includes a standard 9V alkaline battery. There is a battery test position on a rotary switch on the cover.

The 4410A contains an inherently self-balancing amplifier. Its patented bridge circuit has four legs divided between the base and each of the proprietary Plug-In Elements. The bridge circuit allows optimum reading accuracy, with a 5000-to-1 dynamic element range. Temperature extremes do not affect it. Elements for the 4410A plug into the element socket and rotate for forward or reflected measurements.

Price of the 4410A is $545. Presently, the 30 optional Plug-In accessories range from $140–$190 each. For more information, contact *Bird Electronic Corporation, 30303 Aurora Road, Cleveland (Solon) OH 44139-2794. (216) 248-1200.* Or circle Reader Service No. 202.

INTERNATIONAL RADIO AND COMPUTERS, INC.



The TX Enhancer, for use with Kenwood and ICOM transceivers, is a small, shielded box that plugs in between the microphone and the mike jack on your radio. The box contains a status LED and a two-position center-off switch for AM, FM and SSB operation on HF, VHF and UHF radios. One position keys up your transmitter and injects a short duty-pulsed tone into the mike audio. This provides a pulsed drive in SSB for safe, "no rush" tuning of your linear amplifier while allowing more accurate tune-up than you can set by tuning up in the CW mode with a reduced carrier. Each pulse will provide 100% peak output, but the average output will be approximately 25%.

The other position provides a short beep transmitted at the end of each of your transmissions, telling the station you're in contact with that it's his turn to talk. Usable in the PTT mode (and VOX mode with almost all ICOM and most Kenwood models), it is especially useful in roundtables or just plain rag-chewing.

The TX Enhancer needs one battery, which is supplied. The price is $62. Specify the version when ordering: K8-200 works with all Kenwood models that have an 8-pin mike jack; I8-346 works with ICOMs that have an 8-pin mike jack. Add $5 shipping and handling for USA and Canada; $13 elsewhere. Contact *International Radio and Computers, Inc., 751 S. Macedo Blvd., Port St. Lucie FL 34983. (407) 879-6868.* Or circle Reader Service No. 203.

NEMAL ELECTRONICS

Nemal Electronics International has introduced a series of new precision video and audio cables for broadcast, video and RF applications. Both cables comply with the new National Electrical Code requirements, and carry the "CL2" rating.

Nemal part no. 1570 is a precision video coax, similar in size to RG-59/U, offering excellent shielding, low loss (0.7 dB per 100 ft. at 10 MHz), flexibility and low cost ($235 per 1,000 ft.). Nemal part no. 2201A is a one-pair 22 GA cable with foil shielding and drain wire featuring reduced diameter (0.135"), crush resistant construction, and single strip removal of both jacket and foil. The audio cable is available in 7 colors, and in multiple pair counts up to 32 pair, for $79 per 1,000 ft.

Both cables are available either in bulk or pre-terminated, and either on spools or in pull-out boxes. Contact *Nemal Electronics International, Inc., at (914) 359-3333 or FAX (914) 359-3607.* Or circle Reader Service No. 204.

SGC INC.

The Model SG-2000 from SGC, Inc., is a high frequency, single sideband radiotelephone that provides global HF communications on voice and data transmission. It features several sophisticated scanning modes, has a large LCD frequency display, and is remote and ARQ/FEC ready. It also has a splash-proof front panel, an internal clock with turn on/off programming, 616 ITU voice and data channels, and 100 user-programmable memory channels.

This unit is a commercial HF SSB transceiver and incorporates unique features which appeal to the commercial, industrial and pleasure markets. It produces 150 watts, and operates on the 1.8 to 30 MHz frequency bands. All functions for HF SSB operation are built-in, including remote capability (up to 6 remote stations) or remote control through telephone lines. The SG-2000 can be controlled by an IBM or compatible computer without its removable front panel.

Designed as a product for the '90s, the SG-2000 will operate on any marine, commercial and ham frequencies, and has receive capabilities for broadcast and WEATHERFAX frequencies. It retails for $1,995; additional remote heads are $595 each. Contact *SGC, Inc., Sales and Marketing Department, SGC Building, 13737 S.E. 26th St., Bellevue WA 98005. (206) 746-6310.* Or circle Reader Service No. 205.

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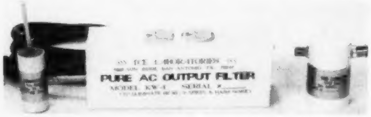

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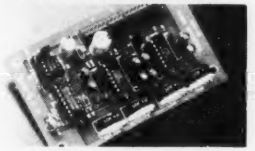

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Setting Up Shop

In previous columns, I've discussed various aspects of equipment repair. Hopefully, I've whetted your appetite enough that you've at least contemplated fixing your own gear the next time it breaks. If you already have an equipped workspace, great! If not, you may consider the prospect of setting one up to be daunting, even intimidating, and perhaps too great an obstacle to overcome. Well, it doesn't have to be! In fact, setting up shop can be fun, and even fairly inexpensive.

Choosing Your Space

The first thing you need, of course, is some place to work. This can range from a desk in the corner of a den to an entire room or basement. Obviously, the bigger the better. But size alone doesn't guarantee a successful workshop. Organization and careful selection and placement of equipment are far more important.

If you have a choice, select a workspace that is quiet and isolated. Electronics work demands concentration, and a noisy living room, with the kids running around and the TV on, just won't do. Not only is such an environment counterproductive, it can be downright dangerous. Deadly high voltages are present in many kinds of equipment, and the slip of a test probe, or a distracted finger, can result in disasters ranging from blown transistors and ICs, to fire or even electrocution. Also, many repairs require leaving equipment open overnight, and family members, especially little children, may inadvertantly damage it, lose the screws, or be injured by it. If you have young kids or pets, use some means, such as a lock on the door, to make sure they can't get to your work area when you're not there.

Furnishing Your Space

It is best if the room is not carpeted. Tiny parts and screws may disappear instantaneously when dropped into carpeting. Although they bounce on a hard floor, and can wind up far from where you dropped them, at least you have a *chance* of finding them! If you must work in a carpeted area, get an old, light-colored, shallow pile carpet scrap and put it directly under your chair, to catch solder drippings and such. Service can be a remarkably messy business, and it's easy to ruin a good carpet. Also, the shallow pile and light color help avoid the twilight zone lost-screw effect.

Once you've selected your workspace, it's time to pick a table on which to work. Try to get the biggest one you can, with shelves if possible. The shelves let you place your large test equipment at eye level, and tremendously increase your effective work area, because they leave the table free for the equipment on which you're working.

> ***". . . today's tiny surface mount parts are soldered in much the same way as were the parts hanging off tube sockets in our grandparents' generation."***

The table should be at a comfortable height, so you won't have a sore back after spending a few hours tracking down that elusive intermittent. For the same reason, the chair should be selected with long sitting periods in mind. An office chair, with wheels or rollers, is best. Avoid fold-up kitchen chairs. The discomfort you'll endure after spending an entire evening in one of those will leave you reluctant to do it again.

Have You Got a Light?

Good lighting is essential. In addition to fairly bright overhead room lighting, you should get a lamp on a swing arm and mount it to a corner of your table. These lights come in two varieties: incandescent and fluorescent. The fluorescent ones usually have a circular tube with a big magnifier in the middle, through which you can view your work. They cost about $80, but get one if you can afford it.

The incandescent lamps only cost about $20, but they get very hot and it can be uncomfortable working with one over your head. Also, they usually have no magnifier. In today's world of microminiature circuits, the lens is very helpful. Finally, get a small, powerful flashlight. For seeing into the dark corners of some chassis, sometimes there's just no substitute.

Basic Tools

You'll need some basic hand tools. Get an assortment of screwdrivers, a pair of needlenose pliers, and a pair of diagonal cutters. Forceps are also very handy. Although some medium size pliers and screwdrivers are required, most of your tools should be small, in keeping with the scale of modern electronics. You can find such tools at your local Radio Shack or hardware store.

You'll also need some chemicals. Tuner cleaner (useful for switches, relays, etc.), isopropyl alcohol and compressed air are especially handy. A tube of supertype glue and a bottle of nail polish remover (which also removes the glue), some light machine oil, and a tube of lubing gel complete the basic chemicals collection.

Some Like it Hot

The backbone of any repair or construction job is, of course, soldering. This connection method has changed little over the entire history of electronics; today's tiny surface mount parts are soldered in much the same way as were the parts hanging off tube sockets in our grandparents' generation. The primary difference is the amount of heat used.

Most modern parts should be soldered using an iron of no more than 30 watts or so. The most convenient and comfortable iron is the kind with a cord leading to a separate stand. Some have an adjustable heat control. If you intend to work with ICs, it is wise to consider an iron with a 3-wire AC plug and a grounded tip, to bypass static charge problems. Avoid the $4.95 pencil types, because they usually don't last very long, and their handles get rather hot. Of all your equipment, you'll use your soldering iron the most, so get one you like.

In addition, it is wise to have a 100–150 watt gun. You can't do some jobs, like PL-259 coax plug wiring, with the small iron; there just isn't enough heat. The guns are usually no more than $20, and well worth it.

Your solder should be 60% tin, 40% lead, and rosin core, which is the kind normally sold by all electronics suppliers. It comes in various diameters, and I recommend using the smallest one you can get. Larger sizes make close work on small boards difficult. Try to buy a one-pound spool, for cost savings. You'll eventually use it all, anyway. Nothing is more frustrating than running out of solder in the middle of a project on a Sunday night. Also, get some wick-type solder remover. This stuff drinks up solder from a connection, making part removal easy. Especially with ICs, it often makes the difference between easy work and a ruined PC board. It comes on small spools at modest cost. Get two.

Testing, Testing

The most influential factor in choosing test gear is your budget. If you can afford spectrum analyzers and computerized signal analysis equipment (and know how to use it), by all means go and get it. If you're like most of us, though, such things are merely dreams. So, where should we begin?

Get a decent analog voltmeter (VOM). Expect to pay $30–$60 for it. A digital meter is also nice, and they have become fairly inexpensive in the last few years. Don't bother to pay for laboratory accuracy unless you really need it, which is unlikely.

If at all possible, get an oscilloscope. There are some decent ones available new for about $350, and used ones abound, too. There is nothing, I repeat nothing, more useful than a scope. If you don't know how to use one, get a book and learn; it isn't hard. Also, see my last column in the January 1990 issue of *73* regarding scopes.

A DC power supply is necessary when working on mobile or portable gear. A variable unit with a few amps current capacity should handle most jobs. High-powered transceivers may require a much bigger supply, but unless you intend to work with lots of them, the cost may not be justified. Consider building your own power supply from a published schematic. With today's IC voltage regulators, it's easy, and can save you quite a bit.

If you've got any money left, consider a frequency counter, particularly if you're going to work with radio gear. The upper counting frequency and the cost generally rise together, but try to get one that will cover the frequencies you are likely to encounter. A 30 MHz counter won't do you much good if you're primarily a VHFer, but it's fine for most HF work.

Other test devices, such as capacitance meters, dip meters, signal generators and transistor testers, are handy but may be dispensable, depending on the kind of work you do. You may be able to borrow a seldom-used instrument. Also, some of them can be homebrewed, and they make nice winter projects. And, of course, you can always pick them up along the way, as your need for them arises.

> *". . . select a workspace that is quiet and isolated."*

Parts is Parts

Get some storage cabinets and fill them with a variety of common components. Label the drawers, and be sure to leave a few empty so you can use them to store the screws from jobs in progress. You should have all the standard resistor values from 10Ω to 1 megohm (¼ watt or ½ watt is fine), disc capacitors up to 0.1 µf, and electrolytic caps up to 250 µf. If you plan to homebrew, also get diodes, common transistors (such as 2N2222, 2N3904, 2N3906, etc.), and some CMOS gates (4001, 4011).

You'll find that no matter how many parts you have, you never have the one you need! Many times, you'll have to buy or order parts in the middle of a job. Especially with Japanese gear, there's just no way around it. Still, the more you have on hand, the better. I keep a pile of PC boards from junked VCRs, CB radios, etc., and pull parts as needed. I can't count the number of times they have saved me from weeks of frustrating waiting.

You'll also need data books. You should have a transistor substitution guide, and books for common CMOS, TTL and linear ICs. Just knowing the pinout of a suspected IC can save you hours of troubleshooting. (Of course, you're supposed to have the schematic for anything you fix, but that's another subject . . .)

Some books may be in your local bookstore, others you may have to order. Often, people will sell or even give you their old ones when they update.

Next time you're at a hamfest, look for parts bargains, junked machines and last year's data books. Often, you can grab a handful of, say, capacitors for $1 that would cost $10 in the store. Or you can buy a wrecked chassis for 50 cents that will yield $50 in parts, some of them hard to get at any price. All in all, hamfests are probably the best place to look to stock your larder.

Putting it all Together

A careful arrangement of your gear and parts will help maximize their usefulness and convenience. There are lots of possibilities, and no right or wrong ways to do it. I keep my soldering iron at table (not shelf) level, off to one side but within arm's reach. My parts cabinets line the back of the table. Small test equipment, such as the frequency counter and power supply, is also at table level, as are small hand tools. On the shelf are the scope, meters, larger tools, and some parts overflow (I've been at this a long time!). Any instruments with displays should be placed for easy reading. I angle the scope so that it points directly at me.

Plug all or most of your AC operated gear into a switched outlet strip, and mount it within reach, so that you can hit the switch in a hurry. Always use it when testing an AC operated repair job, for the same reason. Finally, round out your lab with a vital, but often overlooked, item: a fire extinguisher. You'll probably never use it, but you never know. And it can be a life saver. 73

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73 INTERNATIONAL

edited by C.C.C.

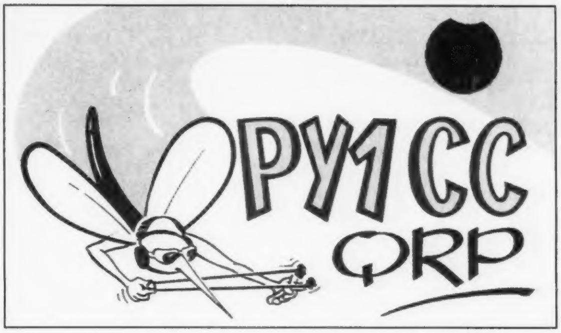


Photo A. QRP QSL card of Carlos PY1CC, a 73 Hambassador from Brazil.

Notes from FN42

WOW! *As the lyrics of a song popular in my earlier days said: "Oh the times they are achanging." Something that many of us felt would never happen has happened. The complete opening of the borders between East and West Berlin, the free flow of citizens between the German Democratic Republic and the Federal Republic of Germany, has happened!*

This event should certainly not override other events of the day, week, month, or year (such as the changes in Poland, the free elections in Namibia, the changes in Bulgaria, and many others) yet it does seem to get the most attention in the U.S. news media. But news is news, and we on this Earth should be very thankful that we have means of rapid communication and joyful communications that herald the reuniting of families and friends after years of separation.

Hopefully the leaders of the many countries that are reopening their borders and those leaders allowing their citizens to take part in governing their country's affairs have finally realized what we hams have known for years, that communicating with each other, listening to each other's ideas, and helping each other makes sense, and can go a long way towards solving the world's problems.

Oh, what a joy it is to live in this time and dream of our future, a future that appears to be getting better and better, not just year-to-year, but day-by-day!

It is not too often that you open your local paper (at least not mine) and find a story from the Associated Press (AP) about a ham. I was very surprised and happy to read an article about 9N1MM, Rev. Marshall D. Moran, an 83-year-old Chicago-born Jesuit priest, the only ham operator in Nepal. Most of the article was about people he had met, such as Mahatma Ghandi and Jawaharlal Nehru, but there was certainly enough to help promote the cause of ham radio. He estimates to the reporter that he has talked to over 80,000 ham operators.

I certainly do not mean or wish to belittle Rev. Moran but the word "talked" caught my eye. How often do we "talk" to another ham, receive the normal "59" or "599" and then go about our business of getting another rare one? How long has it been since you really "talked" to another ham for more than one minute? Do we really "talk" or "communicate"?

According to one of my trusty dictionaries I find: "talk: to deliver or express in speech; to use (a language) for conversing or communicating; to express or exchange ideas by means of spoken words"; "Communicate: an exchange of information; a technique for expressing ideas effectively." Something common to both is the word "idea." "Idea: a formulated thought or opinion."

I will let you formulate your own thoughts as to whether we truly communicate. Our world is changing, sometimes more rapidly than some might wish. Countries are opening borders that have been closed for many years. These borders include the physical as well as the communicative. What we need to remember is that there are many hams around the world with many ideas to convey. Let's say something more than just "59, QSL via the Bureau." Let's really "communicate."

—Arnie N1BAC

Calendar for February

1—St. Bridget's Day, Ireland
2—Groundhog Day, USA
3—Felix Mendelssohn, 1809; Gertrude Stein, 1874; St. Blas, Paraguay
4—Independence Day, Sri Lanka
5—Anniversary of the Constitution, Mexico
6—New Zealand Day
7—Independence Day, Grenada
8—1963 Revolution Day, Iraq
9—Soseki Natsume, 1867; St. Marion's Day, Lebanon
10—St. Paul Day, Malta; Lantern Festival, China
11—National Holiday, Iran; Commemoration of the Founding of the Nation, Japan; Thomas Alva Edison, 1847; Youth Day, Cameroon
12—Lincoln's Birthday, USA
14—Valentine's Day, Race Relations Day, USA
15—Nirvana Day, Buddhist; Susan B. Anthony, USA
18—Democracy Day, Nepal; Independence Day, Gambia; Start of Brotherhood Week, USA
19—President's Day, USA
20—Toshiro Mayuzumi, 1929
21—Robert Gabriel Mugabe, 1924
22—Frederic Chopin, 1810; Independence Day, St. Lucia; Washington's Birthday, USA
23—Isra and Miraj; Georg Friedrich Handel, 1685; National Day, Guyana; National Day, Brunei; Shivarati, Hindu
25—National Holiday, Kuwait; Victory Day, Czechoslovakia
26—Intercalary Days, Bahai; First Day of Lent, Eastern Orthodox
27—Independence Day, Dominican Republic; Shrove Tuesday, Mardi Gras
28—Kalevala Day, Finland; Ash Wednesday

Data for the monthly calendar comes from The 1990 World Calendar published by Educational Extension Systems, PO Box 259, Clarks Summit, PA 18411, Copyright 1989 by P.R. Fischetti, and other sources.

ROUNDUP

Japan From the JARL News: According to the bulletin issued by the Ministry of Posts and Telecommunications, the number of radio stations licensed in accordance with the regulations of Radio Law, reached 5,107,175 as of June 30th, 1989 in Japan. When radio stations are classified, the number of Conventional Radio Stations (Citizen Band Radio, etc.) are 2,390,000, that of Portable Radio Stations (Automobile Radio, Multi Channel Access Radio, etc.) come to 1,540,000 and these are followed by Amateur Radio Stations, 950,000 (18.6% of total). All three kinds of stations are 93.5% of the total Radio Stations.

Sweden From Radio Sweden Bulletin:

PUBLICATIONS: Edition 4.2 of Radio Sweden's *Communications in Space: The DXers Guide to the Galaxy* is now available free of charge from Radio Sweden. This 13-page publication covers satellite radio and television, weather and other "utility" utility satellites, amateur radio in space, and the American and Soviet space programs. [*Radio Sweden, S-105 10 Stockholm, Sweden*]

They are still updating their book *The DXers Guide to Computing* and edition 4 is still several months away. However, due to popular demand, they reprinted the most recent edition, 3.0, in one volume including all updates 3.1 to 3.6. Note that this reprint contains exactly the same information as in the previous edition and updates. It's available from Radio Sweden for USD 3, GBP 2, SEK or FF 20, or 7 IRCs or DM. Please DO NOT send orders for the forthcoming edition 4, as it is still in preparation (George Wood).

Radio Sweden sends out Sweden Calling DXers bulletins every four weeks. Listeners who send in media news go on the mailing list for one year. News can be sent to

George Wood at Swedish telex 11738, Telefax +46-8-667-6283, to CompuServe (Easyplex 70247, 3516), through the FidoNet system to 2:202/297 or to SM0IIN on the packet radio BBS SK0TM. An Electronic Edition is carried on the CompuServe HamNet Forum, the Pinelands BBS, and other telephone-based and packet radio computer bulletin boards.

Switzerland From the International Telecommunication Union (ITU) Press Release:

ITU-COM 89, the first world summit on the electronic media, started on 3 October and finished 8 October 1989 in the presence of 445 Ministers, Ambassadors, Directors-General of broadcasting, business and industry leaders from 123 countries.

Held under the general theme "Towards global information: the electronic media explosion," ITU-COM 89 aimed to draw attention to the growing importance of the electronic media in everyday life and the dynamic growth of the sector.

ITU-COM 89 was essentially a symposium in three parts (policy, technical and legal), combined with an exhibition displaying some of the applications discussed at the symposium: electronic communication applications, digital audio broadcasting, direct satellite broadcasting, high-definition television, cable networks... [*It appears that most, if not all, of the topics have some sort of relationship with ham radio. Looks like a few fun years coming for those who like experimenting.—C.C.C.*]

NEW ZEALAND

Des Chapman ZL2VR
459 Kennedy Road
Napier, New Zealand

New Zealand
1990
©

New Zealand Sesqui-Centennial

1990 is New Zealand's 150th Anniversary year...and the NZART Branches and members have some special events planned to help commemorate the anniversary:

1. The use of the special prefix ZM is presently in operation—its use was authorized from 1st June, 1989 through 31st December, 1990.

2. Scout Jamboree, Hamilton, January 4th–11th, 1990 with a special callsign, ZM1JAM. [*Hopefully some of you had a chance to contact this special station. Info came in too late to include in the January 1990 issue.—C.C.C.*]

3. To celebrate the 150th anniversary of Wellington, ZM6A will operate [*operated?*] from the Wellington Civic Chambers on January 22, 1990.

4. The Northland Branches of NZART plan to have a station ZM1VLA operating at Awanui from February 10th to the 28th, 1990, to commemorate the 60th anniversary of the closing of the last New Zealand Spark Transmitting Station (VLA).

5. The XIV Commonwealth Games Station ZM14CG will be on the air from June 1st, 1989, to February 10th, 1990. A special QSL card and an award are available.

6. A special letter postmark will be used by NZART HQ during 1990.

7. The Marton '90 Award—a "freebie"...Marton Branch 23's contribution to the New Zealand sesqui-centennial is a special award that will operate between January 15th and 29th, 1990. ZL2VS (Branch President, Dusty) will be operating from Waitangi, Chatham Islands, under the special callsign ZM7VS on all HF bands during that period. The Marton Branch station, ZM2AMS, will operate on all bands HF-UHF during the same period. REQUIREMENTS: Work both stations, any band, any mode...details of both contacts required. Listener participation invited. The award is free...just send an SASE or return postage (US$1 approx. for the Americas and Canada) for QSL-card-size award to ZL2IG, E.P. Tombs, Ihakara, R.D.1, Levin, 5500, New Zealand.

8. VK-ZL-OCEANIA Contest, October 1990...Planning is under way to make this contest a truly international VK-ZL-Oceania Contest for 1990 with specially produced Awards and Certificates. Still in the planning stages, but more information will be supplied when details are finalized and confirmed.

9. The XIV Commonwealth Games Award...sponsored by the New Zealand Association of Radio Transmitters, Inc. This award is available to radio amateurs worldwide between June 1st, 1989, and February 10th, 1990.

To qualify for the Award, radio amateurs must contact 5 ZM1 stations...one (1) each of ZM2, ZM2, and ZM4 stations, PLUS one Commonwealth country in Regions I, II, and III, a total of 11 contacts.

The log must be verified by two other amateurs and sent to: The Awards Manager, Aola Johnston, ZL1ALE, 63 Red Hill Road, Papakura, 1703, New Zealand. Please send return postage, approx. US$1 for Americas and Canada.

Good News for NZ Travellers

From the NZ Radio Frequency Service, our regulatory body, comes the news that forthwith, licensed amateurs visiting New Zealand may use VHF/UHF handhelds on frequencies 144 MHz and above, operating for a period of not more than four (4) weeks **without** any application or charges being made.

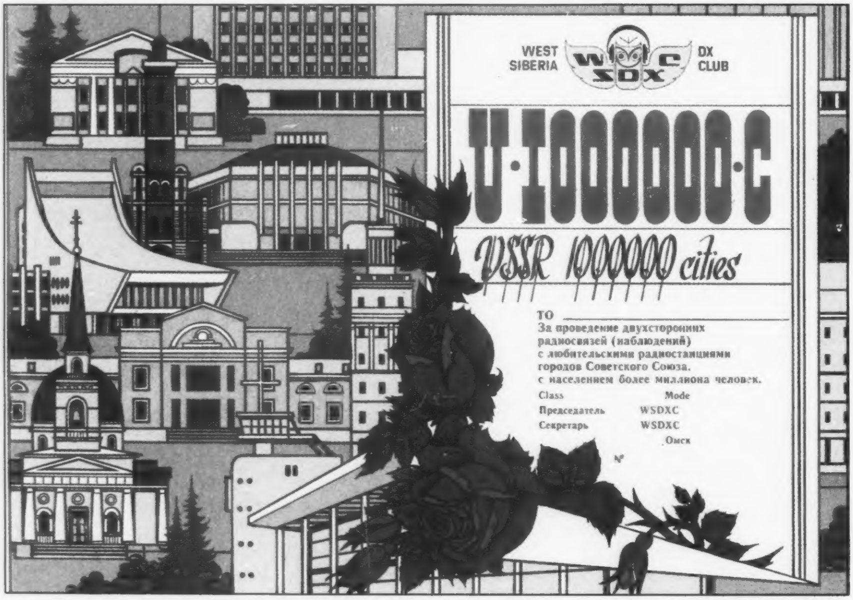
The visiting amateur **MUST** be the holder of a current license issued by their own administration, and **MUST** carry a copy of the current license while operating to be made available for inspection on request.

Usage of the apparatus must conform with the requirements of New Zealand Radio Regulations 1987 and the general terms and conditions shown on the amateur license schedule. The visiting amateur must use the "home" callsign suffixed by ZL1, 2, 3, 4, as appropriate.

This is a very welcome change for our short-term visitors from overseas administrations.

[*This certainly seems to conform with a few other countries that are doing the same thing. Maybe we can dare hope that all the countries on our Earth will do the same thing in time.*
—C.C.C.]

continued on page 82



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*See review in Oct. *73*, 1984 *Sept. *73*, 1985 March *73*, 1986
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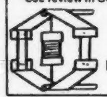

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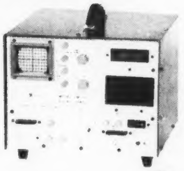

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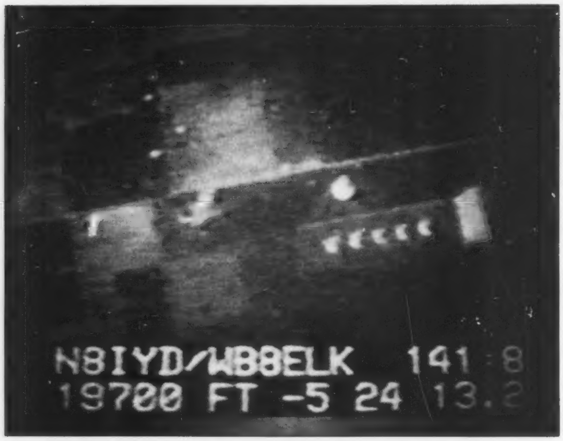

Photo A. Bob N8IYD designed a servo-operated mirror system to provide us with a spectacular view of the ground below.

Since ATV transmissions are allowed only on the 70cm band and above, for best results you should give special consideration to your antenna system. Put up the best antenna you can find, above treetop level, if possible. Some of the more popular antennas are the Jaybeam, KLM series, the K1FO, and home-built Quagis or Colinears. At these frequencies, feedline loss can be one of the most important factors. A cheap grade of RG-8 coax can turn your high gain antenna into a dummy load. Use 9913 coax or hardline whenever possible.

With a 50 watt transmitter and a good antenna system, your local range should be between 30 and 60 miles, depending on the surrounding terrain. Under the right conditions, you can extend your range tremendously.

A good tropo or duct has been responsible for many contacts over several-hundred mile paths. Last March W5VDS and WA4GRK established the US record across the Gulf of Mexico (over 937 miles) on the 1200 MHz ATV band. One hundred mile or more contacts are possible just by taking advantage of early morning and late night band enhancements, particularly during the summer months.

Mountain-topping can be a quick way to create your own band openings. K4SAO and KC4CTW set up last summer on top of 6300′ Roan Mountain in North Carolina, and they were rewarded with several 300 mile ATV contacts!

Aeronautical mobile contacts can really produce some amazing results. Mel KA8LWR has made numerous 140-mile contacts from his Cessna at 10,000 feet, while allowing us all to fly along with him from the comfort of our hamshacks.

ATV Balloon to the Edge of Space

During the past two years, we launched from sites across the country a series of helium balloons carrying ATV transmitters. These balloons usually go beyond 100,000 feet in altitude before bursting and parachuting the payload to Earth. With just 1 watt to an omni-directional antenna, the ATV signal has been received over 400 miles away, covering a 10 state area!

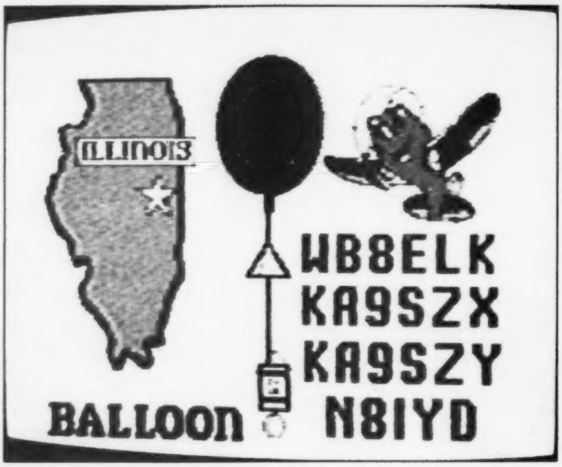

Photo B. ATV transmission received by W9ZIH and WB0ZJP at 150 miles.

On October 7, 1989, KA9SZX and and I launched the latest of these from Champaign, Illinois. Bob N8IYD designed a servo-operated mirror system to provide us with a spectacular view of the ground below, as well as views of the horizon showing the Earth's curvature from the onboard B/W TV camera. We're planning several flights in the spring and summer—keep a lookout for dates, times, and places here.

All you need to view these balloon flights and local ATV QSOs is a 70cm antenna system! If you have no ATV equipment, just hook your antenna up to a cable-ready TV or VCR. It turns out that cable channel 60 is on 439.25 MHz (Note: this is not UHF channel 60; you have to switch your TV or VCR to the cable channel position). You can view other popular 70cm ATV frequencies on either cable channel 57, 58 or 59.

Go Fly a Kite!

Jon Pifer WM8W of Arlington, Ohio, came up with a unique way of raising his antenna height. He built a mammoth 16-foot Delta Wing kite to take his 1 watt ATV transmitter and camera to new heights. With a good wind, this kite will take his 3-pound package up to over 500 feet for some fantastic aerial views of the area. If you want a good workout, try reeling in 1000 feet of kite string! Jon plans to attach two radio control servos to remotely point his camera on his next flights.

Finding ATV Activity

If you're in an area with little or no ATV activity, try to get a nearby friend involved or you may end up watching a TV screen full of snow!

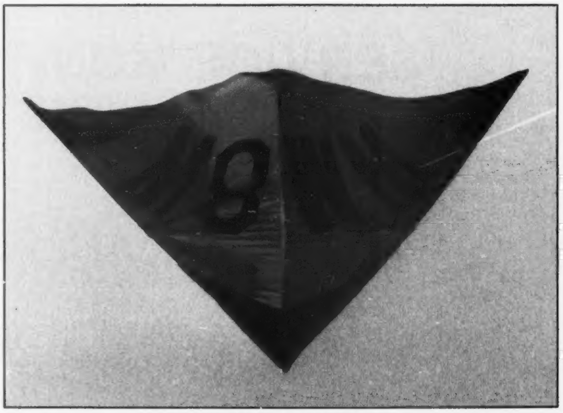

Photo C. Fly a kite with ATV!

Sometimes all it takes is a knowledge of 2 meter calling frequencies to scare up some unexpected contacts. 144.34 MHz has become the calling frequency in the Midwest, and 147.45 MHz in parts of Ohio. If in Southern California, call on 146.43—that will usually net you an ATVer.

Video Tape Contest

The Western Washington ATV Society is sponsoring a video tape contest. All you have to do is make a 15-minute video presentation using home video equipment. First prize is an ICOM IC-1275, second prize is an AEA FS-430 ATV transceiver, and third prize is a P.C. Electronics receive converter. For complete rules, send an SASE to WWATS Video Contest, 353 S. 116th St., Seattle WA 98168. All entries must be in by March 1, 1990. Winners will be announced at the Dayton Hamvention 1990.

ATV NET—3.871 MHz

In the eastern half of the country, a weekly ATV net meets every Tuesday night at 8 PM EST on 3.871 MHz. I'd like to see this become a national net. Would anyone would like to volunteer for western net control? If you'd like to find out about local activity in your area, check into the ATV Net or send me an SASE. I'd be happy to help hook you up with any local ATVers. I can also be reached via the N8ET BBS on packet.

In the following months, we will cover ATV repeaters and special happenings, plus circuits you can build to enhance your ATV station. Stay tuned... 73s, Bill 73

Bill WB8ELK, our new ATV columnist, has been active in ATV since 1969. He's noted for his many high altitude balloon ATV experiments. He holds an MSEE and owns Elktronics of Findlay, Ohio, a business that specializes in ATV products. Bill is also co-publisher of Amateur Television Quarterly Magazine.

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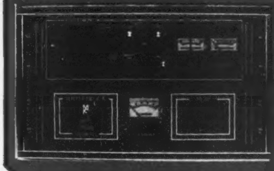

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LOOKING WEST

Bill Pasternak WA6ITF
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Nineteen-year-old Kelly Howard N6PNY, a star in the *New World of Amateur Radio* video, and one of my panelists at the Amateur Radio Media Forum at the Dayton Hamvention, noticed that there was nothing at the Hamvention for younger hams and young people wanting to be hams. I suggested she talk with the planners of the 1990 Hamvention. Here is her message . . .

To the Young

"You may be asking yourself, is it really true? Are we finally going to have something especially planned for the younger folks to get them interested in our world of radio? You can stop wondering because the rumors are true. On Saturday, April 28, young people will be gathering at the Hara Arena in Dayton, Ohio. They will share the day with a room full of enthusiastic ham operators and working amateur radio gear.

People and equipment are ready to share the Amateur Radio Experience with young people who are interested, or who might become interested. This gathering will permit those attending to contact someone in a faraway land, or maybe on the premises of the Hamvention itself. Along with being able to communicate, many door prizes will be given. The day will be very uplifting for all.

"Another question you might be asking yourselves is, how did this forum all come about? It all started when I first went to Dayton Hamvention in 1989. The convention was so overwhelming, there was hardly any time to sleep, let alone see all the exhibits in three days. On Sunday, the last day of the event, everyone involved in the planning of the Hamvention gathered in a Mexican restaurant and talked about the wonderful time they had. I was invited to join this group in their memories and thought this the opportune time to throw a little of the future at them. I brought up the idea of a forum for younger people where they could feel free to ask questions, and under the supervision of young hams, to contact other ham operators anywhere those little frequencies allowed them to. Kind of like a Children's Zoo where they could actually touch the animals to get more familiar with what is really out there in this huge world of ours.

"That's what this whole thing boils down to as far as getting it started. But let me tell you just getting it organized was the fun part. Not until you actually set your mind to doing something does it seem so easy. There have been so many people right beside me all the way with this who are willing to help no matter what. People really took off on this idea and got fired up about it.

"The weekend of the 1990 Dayton Hamvention will hold many exciting adventures, and I promise that this forum will be one of them. If you are a teenager or the parent of a young person interested in amateur radio or who might become interested in amateur radio, bring them by. We will introduce them to our special world. Our own new world of amateur radio. So come one, come all, and have a good time . . ." de N6PNY

Number 35 on your Feedback card

HAM HELP

Your Bulletin Board

We are happy to provide Ham Help listings free on a space available basis. To make our job easier and to ensure that your listing is correct, please type or print your request clearly, double spaced, on a full (8½" x 11") sheet of paper. You may also upload a listing as E-mail to Sysop to the 73 BBS, (120 baud, 8 data bits, no parity, 1 stop bit, (603) 525-4438). Use upper- and lower-case letters where appropriate. Also, print numbers carefully—a 1, for example, can be misread as the letters l or i, or even the number 7. Thank you for your cooperation.

Needed: Manual and schematics for a National NCX 5 transceiver. I will gladly pay postage and copying expenses. *Kevin Lemon, 11 Bartlett St., St. Catharines, Ont. Canada L2M 5K8.*

I am looking for an instruction manual and/or schematic for a "Thunderbolt 305" 10m amplifier. I will pay for copying and shipping. *Arnold "Ben" Irvine N3CNH, 653 Blue Church Rd., Coopersburg PA 18036.*

I need a schematic diagram and/or repair manual for a Galaxy III Transceiver by World Radio, 80-40-20. I will pay all costs for a copy, or I will copy and return the original. Thank you. *Jim Crawford NY5Y, P.O. Box 643, Lovington NM 88260.*

Wanted: ICOM FM unit EX-106 for an ICOM 6 meter transceiver Model IC-551D. *Piero A. Sassu N3FVG, 714 W. Marshall St., Norristown PA 19401.*

I need service information and a schematic for a DSI Instruments Inc., Model 5600A Frequency Counter. I will pay copying costs and postage, or I will copy and return the original. Thank you. *John Rusinko, 38A Union Ave., Little Falls NJ 07424.*

Never Say Die

Continued from page 4

to force others to suffer as I did.

A few years ago I explained all this and came out with my set of four cassettes to help make the code more painless. The brainwashing caused by the FCC's acceptance of the progressive code system and its support by a number of firms with code courses has made it so only a few of the people who've bought my tapes actually use them as I recommend.

My first tape (73T05) has the letters, numbers and punctuation to help people memorize them. One or two times through should do for that. Then I have a practice tape for people who actually want to bother to learn to copy code at 5 wpm (73T06). Tape 73T13 will help you learn to copy at 13 per. I put this out because it was simpler than trying to convince everyone just to skip it and go to 73T20. If you want to make extra work for yourself, that's your decision. It takes about twice as long to master both 13 and 20 wpm speeds as it does either of them alone.

There are undoubtedly some other excellent code tapes. I should buy 'em all and see which are good and which aren't. I'll tell you what, you check 'em out for me and let me know and I'll use the time I save for something else—perhaps a day of skiing—or rag-chewing with DX ops I might visit some day.

Getting a ham ticket is pretty easy these days. A few hours on the code, the memorization of some Q&A and you're in. Oh, it isn't nearly as easy as it was a few years ago when Dick Bash sold the exact FCC exam answers, including the code tests. Thousands were able to get their Extra Class licenses without even having to know the code or one shred of theory.

I hope this will put the code into better perspective for you. It's easy to learn, but since there seems no way to break the perception kids get from us that it's hard, it'll keep us from getting much ham growth until we do away with it as an obstacle.

Even if we were to completely eliminate the code from the license exam, I feel that we'd still have to mount a major PR and advertising effort to attract youngsters to our hobby. It's just that without the code we might be able to get most of 'em licensed.

If you want to know more about how the brain works, there are plenty of good books on the subject. If you run into me on the air ask me about it—and settle back for half an hour. I doubt if many people will be interested in my own extensive (and to me, fascinating) research on how the mind works, so I'd rather you don't bring it up when I'm giving a talk at hamfests. I have a pretty good idea why not one scientist has yet been able to even get a hint as to how our memory works.

If you are Elmering newcomers, try my code system and see if it doesn't work miracles for you.

Faster, Faster!

While 95% of us are still communicating, and I am using the word in its most generous sense, at an effective rate of a few words per minute, a small coterie of hams are tripping along at a brisk 1200 baud. Baudy bunch.

Rag-chewers are able to mumble about 125 indistinct words per minute. The throughput plunges on 20m, when one is fighting QRM. Since ops seem to figure that when there's 2 kHz between two groups in contact that this constitutes a clear frequency, almost inpenetrable QRM is the norm.

If you read the October 73 you know that there's a growing group of hams experimenting with 56,000 baud (56K) packet. Many packeteers are running at a creepy 300 baud, with 1.2K (wow!) being the fast lane. It was mentioned in October that the Japanese are running 9.6K, using fax ICs.

For some reason there seems to be an aversion to translating bauds into words per minute, which might make throughput more understandable. 300 baud, when we're sending the 8-bit ASCII code, plus a start, stop and parity bit, means we're using 11 bits for each character. That's 300/11 = 27.27 characters per second = x60 = 1636 characters per minute. If we take the average word to have five characters, plus a space, we're talking about 275 words per minute. Not bad, compared to talking.

At 1.2K we're up to 1090 wpm. At 9.6K we're at about 8725 wpm. 56K brings us to 50,000 wpm. If we have 500 words per page, that's 100 pages per minute. Heck, even my editorials wouldn't take long to send at that speed. In more practical terms, if you start communicating at this speed by writing, it might take you ten minutes to write the page and then 1/100th of a minute to send it—about a half second. That's about right. With that speed it would be easy to have a couple hundred round tables all on the same channel without any interference.

Of course, if anyone starts taking my suggestion about setting up a 16-bit dictionary seriously, we could assign bit combinations to 65,000 different words and send each as one 16-bit word, thus increasing our throughput by 3.5 times to 175,000 wpm.

Why Not Packet?

Since a packet TNC and computer doesn't cost much these days, I suspect the main obstacle stopping most of you is the daunting new technology. It's as full of acronyms as computers and there are few reliable learning materials sources. If you want to get a headache even Excedrin can't touch, just try reading a packet handbook. Good luck.

We're all cautious (afraid) of new things, so it's easier to put off thinking packet than to face coping with a whole new language. With the average ham age almost 60, tender egos are right out there on line when it comes to looking foolish. And that's what it looks like we're all inevitably going to do when we finally take the plunge into packet. Isn't it time to demystify packet?

The RTTY Revolution

Along about 1948 I got interested in RTTY. Lordy, that was over 40 years ago! Getting basic information about RTTY was every bit as difficult then as packet is today. In between television jobs, I took some time to build and experiment with RTTY. Thus, in 1951, when I got a job as a TV director with WXEL in Cleveland, I was delighted to find they had a mimeo machine. I'd been fussing with my fellow RTTY experimenters, grumbling that someone should publish a newsletter. When a mimeo machine turned up, I quickly put out my first publication. Within a few months I had over 2,000 subscribers!

This got *CQ* after me to do an RTTY column. Both in my Amateur Radio Frontiers newsletter and in my *CQ* column I did everything I could to make RTTY simple to understand. I explained the fundamentals—described all the available equipment—how to build terminal units—how to fix printers.

When repeaters came along in 1969 I did the same with *73*, backing it up with a monthly Repeater Bulletin. These articles made repeaters understandable and soon had over a hundred thousand hams enjoying repeaters.

Now I'd like to see simple basic articles on packet. I'd like to see articles on higher speed experimenting, so let's get busy with 4.8K, 9.6K and on up to 56K. Heck, why not 112K? Sure, it takes more bandwidth, but the throughput far more than makes up for the extra bandwidth. As was mentioned in the October issue, when you go from 1.2K to 9.6K your signal takes up five times as much spectrum, 100 kHz vs. 20 kHz, but your throughput goes up by 46.7 times. Whew!

But I'm not at all sure we're up against a wall on bandwidth. When Ma Bell's minions tell me they're pushing 117K through twisted pair wires, I know darned well they have some pretty good ways of handling that digital data. Between narrowing our bandwidths and compacting our data, I'll be surprised if we can't get a 9.6K channel so it can be used on 20m.

Please don't make me turn to Japan for solutions to these problems. Let's see what you can do. I'll be delighted to help get your info out to spur on others via *73*.

In the meanwhile we need articles on packet basics—articles written in plain English, with as few acronyms as possible. This will encourage a few thousand more hams to give packet a try. This, in turn, will provide the interest needed for more experimenting.

We all want to know how packet works. We also want a simplified explanation of what equipment we need to try it. We need step-by-step guidance through our first contact, both on HF and VHF.

As we get into higher speeds we may well want to move some VHF packet repeaters up to the microwaves—the same ones the FCC will darned well take away from us if we don't start using them. 1.2 GHz, for example, is a great band—and virtually empty. There's plenty of equipment for this band available too.

Pictures, Too

Once you're set up to move computer data over the air you can send anything you like. You can send digitally encoded music, text, computer programs or even pictures. The Japanese are busy sending color graphics via packet using the NPLPS protocol. This is the system developed for use in the U.K. for their home computer information service. It's a data compressed way of sending graphic information.

Of course, if you prefer to spend your declining years rag-chewing on 75m instead of experimenting—or perhaps working desperately toward your Worked All Counties award, hoping to leave your hard-won certificate to your widow as your main legacy, then I shouldn't bother you with visions of the fun you might have pioneering a new technology.

Parity

It's just a small loose end, but earlier on I mentioned a parity bit. This is an extra bit which is added to your data in order to let you know when you are having transmission errors. You can agree on odd, even or no parity. Odd parity means your computer will add up the "1" bits for a character and, if the number is even, add an extra bit so the total is odd. Thus, if the person getting your message gets any characters which have even parity, you know you are having problems.

I also mentioned mumbling on voice. Oh, I don't mind so much if you mumble while you're talking to me during a QSO, but at least give me a break when you are calling! Please enunciate your call letters clearly and distinctly.

One other thing, why do you get upset when I get your call wrong? I carefully spell out the letters of my call and then you come back to W2MSB or something. I correct you and you don't pay any attention, still calling me W2MSB. Then, when I purposely mangle your call in retaliation, you get all bent out of shape.

Another Way To Reach Kids

I've been fussing with hamfest officials to push their local clubs to set up exhibits at hamfests and conventions which would explain some aspect of our hobby rather than just sitting behind a table with some membership literature. Then the local media could be encouraged to try and get youngsters to come to the hamfest and see what amateur radio is all about.

It's a challenge to design an exhibit which will show how repeaters work and communicate how much fun we have with them. Or why DXers are so dedicated to their seemingly idiotic pursuit of making ten-second contacts with 400 different countries.

I mentioned that when your club gets an opportunity to set up an exhibit in a local shopping center that it should be

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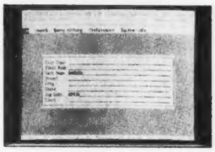

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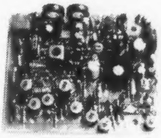

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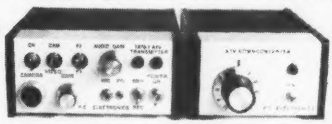

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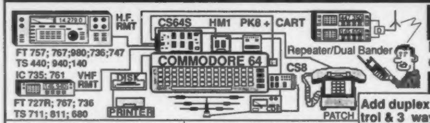

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designed to educate kids rather than the usual table with pieces of almost unreadable ARRL throwaways and a ham busy operating a rig several feet away, talking some strange language.

I've seen the ham exhibits at several world fairs and none of them have been set up to try and sell our hobby. They all have had ropes to keep the public away. The ham gear is usually brand new, state-of-the-art, expensive-looking and frighteningly complicated.

Okay, we've managed to screw up every opportunity to sell our hobby so far. You only have to look at the ARRL ham videos to see the problem. Like our fair exhibits, they are exercises in self-congratulation, preaching to the choir. None of them have been designed to try and interest newcomers. No one involved has done the most basic marketing-oriented thinking—putting himself in the place of the potential customer and saying, hey, what would get me to buy into this hobby?

Well, if you and your club are just too busy to try and sell amateur radio to kids at shopping centers or at hamfests, I have one more suggestion. Most cities have a science museum. Could your club take on designing and building an exhibit illustrating one aspect of amateur radio for the museum?

Amateur radio is a whole bunch of hobbies, so each needs to be sold differently. Imagine your science museum with exhibits from local ham clubs, each showing a different aspect of our hobby. We have repeaters, Oscar, DXing, special interest nets, home building, packet, SSTV, ATV, fox orienteering, certificate hunting, contesting, moonbouncing, etc.

If any club anywhere in the whole world decides to set up an exhibit to promote ham radio, please take a good picture of it for possible use in *73*. If that's just too much bother, at least write and let me know where it is so I can fly out and take the picture myself.

Yes, it's a challenge to try to communicate the fun we have with amateur radio—all in a small exhibit which can fit on a table at a hamfest, mall or science museum. Can you do it with some posters and pictures? Do you need a short video? It's better if the exhibit has some participatory aspect so kids can actually operate it in some way. Get 'em personally involved.

Let me know how you make out.

The Desktop Publishing Revolution—And You

Unless you've been particularly isolated from world events, you're aware that desktop publishing is a roaring new industry. On the off chance that you need a hit in the head to get your attention on what this new industry means to you . . . whack!

A recent reader survey shows that 80% of you already have a computer. Good first step. Probably. In reality desktop publishing was developed on the Macintosh and bloomed in Apple country. The PC crowd suddenly noticed that something important was getting away from them, so they've been playing Big Mac catch-up—with only fair success. El Macco is still out in front.

So what does desktop publishing mean to you? Unless you're firmly retired and are devoting your remaining days to improving the world via the best golf scores you can enter on God's Score Card as your contribution, you probably have a good publishing application which you've been missing.

For instance, small retailers have been cleaning up by putting out newsletters and catalogs. Many products and services today require much more than a couple minutes of salesman time to make the sale. Just look at the complexity of today's ham products. Few of them can be explained in a simple magazine ad—many aren't given a reasonable chance in the stores. The products, their benefits and nuances are just too complex to communicate in anything less than a booklet.

Retailers are getting their customers to keep coming back with newsletters and catalogs. Few stores can survive on first customer visits. It's the repeat customers who make or break a business. A recent survey of retailers who have started newsletters for their customers shows they've found them to increase their business by at least 50%. Some have been registering 50% per month increases, according to a report on desktop publishing at the Consumer Electronics Show.

I've mentioned in the past the power of a newsletter not just to keep a ham club alive, but to contribute substantially to its growth.

Starting Up

If you're going to start from scratch and buy a Macintosh with a laser printer you're going to have to shell out around $7,500, including software. That's a pittance for most businesses.

You know, even though I've set up a $500,000 state-of-the-art typesetting system for Wayne Green Enterprises, we've added a Macintosh desktop publishing system. It doesn't do everything the big system does, naturally, but it sure takes the load off for smaller jobs.

For instance, I've been writing a *Green Congressional Technology Newsletter*. I write it on my Model 100 laptop computer, which I use anywhere I happen to be. I dump my copy to a disk which is then transferred to the Mac. It's then printed out on a laser printer and the finished pages are sent out to be printed.

In this way I'm able to send a newsletter to Congress quickly and inexpensively, helping them cope with the impact of technology on their legislative decisions. They need a good information source on amateur radio, CB, compact discs, DAT, synthesized sampling, digital communications, cellular radio and so on.

The Mac also has speeded up and cut production costs on *Music Retailing*, a publication we send to some 10,000 record retailers. I write my usual long editorial, the editor adds information sent in by retailers, plus information from record companies and the industry. The aim is to help boost CD sales and to provide an advertising medium for record companies to reach music retailers.

My wife Sherry has been learning how to use the Macintosh. She bought a complete desktop publishing system and uses it to put out a newsletter/catalog for her sixty how-to-dance videos.

The how-to video market is largely a mail order business since so few video stores have enough demand in their small sales area to stock anything more than best-selling movies. The few video mail order catalog firms are listing her videos. The biggest, S.I. Video, says hers are their best-selling videos!

So, as you can see, I'm surrounded by desktop publishing these days—at work we're cranking out newsletters without bogging down our main typesetting system (which is kept quite busy with *73*, *CD Review* and *The CD Guide*.

Sure, there are some businesses where a newsletter or catalog wouldn't be helpful, but not many. Just in the last two years the technology has progressed to where it's practical to put together newsletters in the office or at home. Any real entrepreneur should be able to make a desktop publishing system pay for itself many times over doing newsletters and catalogs for local businesses as a part-time home business.

What real estate business couldn't use a monthly listing catalog? Retailers need catalogs as a way to move close-outs and keep from building up dead inventory. They also want to remind customers to come in and see what's new—no store traffic, no business. And what a great way to make sure prospective customers understand the benefits and features of new products?

How about getting some local restaurants to use daily printed menus which customers can take home as souvenirs to remind them to come back?

Look at the incredible success of catalogs such as JS&A, DAK and so on, catalogs where a full page or two are devoted to explaining the details of a product. That beats the heck out of a simple product listing.

I'm always astounded at how much of a sales pitch many ham manufacturers have for their products when I get an opportunity to talk with them in person—like at Dayton. Many have a whole raft of reasons why I should buy the product—reasons which I'd never guess from their magazine ads and brochures. If they could produce some extensive sales information to send to reader's service requests I'm sure they could double or triple sales.

Ham Clubs

Ham clubs can easily double meeting attendance with a newsletter. To get members to meetings you have to have a program which sounds like fun—some food—and then make sure they plan for the meeting way ahead of time. If the meeting is fun you'll have a good chance of getting 'em back the next time.

Now, how do you make meetings fun? Well, that calls for a book-length editorial. It means not only providing good entertainment, but recognition for each person—plus plenty of opportunities to mix and talk with other local hams.

It means getting DXers to bring in and show their prize QSL cards. It means getting packeteers to bring in their printouts of interesting contacts. It means getting the builders to bring in their latest gadget for a show and tell. It means club activities such as fox hunts, Field Day, VHF contests. It means getting all this news and excitement into newsletters.

Sometimes I think you'll get fed up with me exhorting you to go into business for yourself. Then I get a letter from a reader saying my editorials got to him and he's done it successfully—and thanks. A recent letter from a handicapped ham said my editorials got him over being sorry for himself and got him going. He set up a computer and is doing well as an independent programmer—working at home. I'm not going to shut up until every one of you is making more money than you really need. It's out there if you have the guts to go for it. You don't even have to be able to walk, talk, or even see.

Look, when microcomputers first came along I wrote in *73* and said hey, here's a new industry starting, why not take advantage of it? Like ham radio, it was a technical business, perfectly geared to hams. Hundreds of hams did go into computers—with hardware, software, retailing—and many who got there early got rich.

Then came the compact disc. I wrote again explaining the opportunities open in this brand new industry. Though the microcomputer industry grew 235% a year for eight years, the compact disc industry has been growing even faster.

Desktop publishing has been growing like stink, but you haven't seen anything yet. Since most of you have computers it isn't like you have to start from square one to learn. Of course if you'd prefer to wait for me to spot another new high tech industry starting up, all okay. Why get rich today when you can do it tomorrow and spend today watching TV, drinking beer and taking it easy. Right? Then you'll start whining because I'm charging $20 a year for *73*.

Speaking of $20 for *73*—you know, that's about the price of a good dinner out these days. And that's about what *73* cost for a subscription back 29 years ago when I started it! In 1962, when I moved to New Hampshire, a dinner at the "88" restaurant in Manchester ran about $3—and that was by far the finest restaurant in the state. Most things have gone up at least ten times in the last 28 years, so stop griping.

How many needs can you think of for newsletters? One purely personal application for me is for a quarterly *Drum Newsletter*. The USS Drum (SS-228) is on permanent display in Mobile, so

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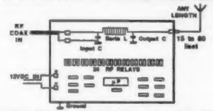

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that's where my old WWII submariner crewmates gather for a yearly reunion. The *Drum Newsletter*, which I've been publishing for quite a few years, helps keep the group together and bring 'em back for reunions.

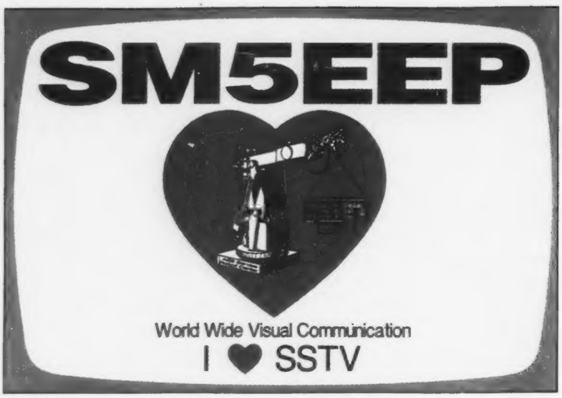
Sherry's been editing and publishing a *Mensa SIG* (Special Interest Group) *Newsletter*, which her Mac makes easy. Are you a member of a club or group which doesn't have a newsletter? Perhaps there's an opportunity to have fun and be of some value to others. If I weren't a bit too busy, I'd start a retired racing greyhounds newsletter to help find homes for the thousands of dogs which are no longer of value for racing, but which make incredibly wonderful pets. I hate to think of these beautiful, loving and intelligent dogs being killed once their racing days are over.

If the cost of a desktop publishing system is a bit steep for you, you might check around and see if there are some systems available for rental on an hourly basis. We have one in Peterborough, so it isn't like this is exactly a rarity. This is probably an el cheapo way to get training on the system—saving you some sleepless (but exciting) nights.

Look at it this way. . . I know you've been reading about the ICOM 781 and licking your chops. But, not having followed Uncle Wayne's advice, you don't have a lousy extra $7,000 burning a hole in your pocket. So get off the stick—shape up—get a move on—stop whining and making excuses. Hey, they even have spelling checkers for your computer these days, so not knowing how to spell is no longer an excuse.

Not that spelling (or grammar) has ever stopped anyone with gumption. Two of my long-time *73* columnists were so terrible at spelling and grammar that we routinely used their raw copy as tests of editorial skill. If someone could make their stuff readable we'd hire 'em. An interesting note—both chaps now publish successful ham newsletters.

I'd like to see specialty newsletters for every ham interest: fox hunting, RTTY, SSTV, packet, moonbounce, satellite, weather, traffic and so on. You start 'em up and I'll help you build a national readership. No, they don't have to be non-profit—charge for 'em and make it worth your while. Keep your eye on that 781, right? That way you can do well by doing good—like the missionaries did in Hawaii.



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73 International

Continued from page 74

SOUTH AFRICA

Peter Strauss ZS6ET
PO Box 35461
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South Africa

Amateur Radio Statistics

The total number of Amateur Radio Licenses issued by the South African license authority has declined from 5163 in 1988 to 4691 in 1989. This is a decrease of 9.1%. The holders of ZR and ZS licenses have declined by 1.0% but the number of listener members has increased by 111%, from 342 to 722 members.

The 111% increase of listeners is a testimonial to the efforts made at various levels to encourage young people to join the amateur service and guarantee growth for the 1990s.

The Amateur Radio licensees are now being sorted into their respective ZS and ZR groups for the purpose of IARU statistics. 3328 Amateurs hold the CEPT class I compatible ZS license. 1363 Amateurs hold the CEPT class II compatible ZR license.

The number of repeater licenses has increased from 87 to 94, a reasonable 8%. Digital repeaters (digipeaters) increased from 14 to 21, an outstanding 50% and an indication of the interest that the Packet mode commands.

South African Radio Amateurs to Build Satellites

At the 10th Anniversary SA Amsat Satellite Communications Conference held in Johannesburg on 12 August, 1989, the President of the Association, Hans van de Groenendaal, announced that South African Radio Amateurs will build two satellites over the next three to five years.

The first project, is the development, design and construction of a communications module for the international Amsat Phase 3D satellite, which will be launched in 1992 in an elliptical orbit. This satellite is being designed to bring Amateur Radio satellite activity within the grasp of enthusiasts who own the minimum of equipment. It will include several educational experiments.

The second project, running in parallel with the international participation, is the development, design and construction of a microsat, a 30cm satellite, which will be launched in a low earth orbit 700–800 km high. This satellite will be self-contained and totally of South African origin.

The purpose of the SA Amsat microsat will be to provide digital store and forward communications, linking many Amateur Radio bulletin board systems around the country. "We are also planning to include a voice transponder and several educational experiments," Van de Groenendaal said. "The community will also benefit from this project, as the new satellite will enhance the Radio Amateur's ability to provide communications during floods and other natural disasters when official channels may fail."

The SA Amsat space programme will provide exciting opportunities for South African Radio Amateurs and students at technikons and universities to experiment with new technologies and develop their skills in Electronics and Computer Science.

MFJ 941D

continued from page 37

Performance

Electrically, the tuning circuit is a "T-match" system, using two variable capacitors in series with a tapped inductor shunted to ground. One would expect this circuit to exhibit a moderately high Q, similar to a "T section" filter. And it does, as the optimum settings for a given match are quite narrow—that is, one setting of the inductor is usually best. Where the mismatch is more severe, the settings on the 941D become critical. Conversely, when presented with impedances in the 75 to 100Ω range, the tuning is quite broad.

So far, I've been able to match up random 500–600Ω longwire antennas, using a good ground connection as a counterpoise. The settings are very sharp, but stable and repeatable. . . very important when contesting and jumping around between bands. And there's been no evidence of the balun core saturating at this power level. The 941D's power and SWR meter agree quite closely with a Bird 43 Thruline on all bands from 160 through 10 meters. A toroidal coupler is used, as sensitivity of wattmeters is quite low in the HF range. SWR is calculated by setting the front panel control for a full meter deflection, then switching to REF.

Using the 941D, I'm able to set up the A3 on 40 meters to operate under 2:1 from 7.200 to 7.300, or from the low end of the band up through 7.125, just by changing the inductor setting. Fifteen meters is similarly covered with one setting, resulting in under 2:1 performance across most of the band. In either case, you can get the A3's original settings by switching either coax line to DIRECT on the front panel, so rapid QSYing is a breeze.

For 160 and 80 meter operation, I'll use an end-fed 250′ longwire, connecting a balun at the feedpoint to eliminate RF burns in the shack. By attaching the counterpoise outside and transforming down to open wire line, the internal 4:1 balun will be matching 150–200Ω to 50Ω unbalanced, and it should tune fairly smoothly. Pretty versatile!

Pete Putman KT2B, former "Above and Beyond" columnist, has written many reviews for 73. You can reach him at 3353 Fieldstone Dr., Doylestown PA 18901.

Continued from page 18

of this magnitude or greater, and on October 17 this attention to detail paid off. Condor withstood the test and went on to handle a traffic load that would boggle the mind of anyone listening in.

There is no way to establish the message count handled by those using Condor, but it has to be in the thousands. Unfortunately, the Condor Connection is slated for oblivion. The FCC recently reallocated the spectrum between 220–222 MHz to Land Mobile Services.

What About the Next Time?

In the crowded amateur bands of California, there is no place left to relocate the Condor Connection. As vital as it is, there appears to be no way to convince repeater owners of 2 meters, 220 MHz and 450 MHz to vacate channels for Condor.

As I am writing this only hours since the emergency began, information pertaining to amateur radio involvement is still scarce. Some of it, regarding organized malicious interference, is dismaying. I enjoy writing about the triumphs of those in our hobby/service who, like Al Romeo N6OJO, Frank Collins N6TAF, Lew Jenkin N6VV, Mark Gilmore WB6RHQ, and countless others whose names we may never know, are providing the kind of community support indicative of what we hams are supposed to be.

The San Francisco quake brought many hams closer then ever before. It proved the importance of the new digital modes and their ability to handle volumes of traffic quickly and effectively. It has also opened up a new dialogue between the analog and digital worlds that will definitely lead to more interaction and cooperation between the two.

CBers Not to Blame

But the quake also pointed out that we have among our ranks psychotics holding amateur radio operator licenses. We cannot excuse the organized jamming of the emergency communications. We can't blame it on "CBers with stolen rigs." Hams did it. People who studied for their licenses. Who took a test of Morse Code and amateur radio theory. Human beings who probably shelled out several thousand dollars to set up a ham station, and what for? To destroy!

In the late 1970s and early 1980s, California had a master legal tactician who devoted himself to putting the sickies off the air. He was able to reduce the amount of malicious interference to almost zero. The Dayton Amateur Radio Association recognized his work and awarded him its Specific Achievement Award. His solving the jamming problem also almost cost him his life when he suffered a massive heart attack as a result. Joe Merdler N6AHU, where are you when we need you! 73

You can reach Bill Pasternak WA6ITF at 28197 Robin Ave., Saugus CA 91450 or on MCI, Westradio 324-1437.

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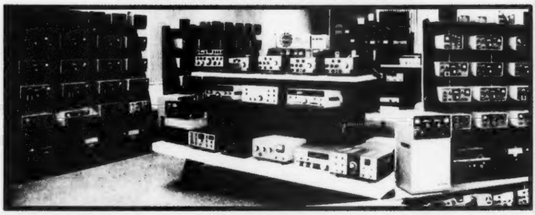

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DX Countries

There is no doubt that the DX Century Club Award (DXCC) sponsored by the ARRL is the most popular DX award in existence today. Most DX country awards are based on the ARRL DXCC Countries List. As I write this article, the number of DXCC countries is 321, but only a few days ago the ARRL's DX Advisory Committee (DXAC) recommended that two new countries be added to the list: Banaba Island and Conway Reef.

In late 1989, the DXAC considered many applications for separate country status, but they recommended only Banaba Island and Conway Reef. Applications they didn't recommend: Frederick Reef, Austral Islands, and the Marquesas, Tatoosh, and Guemes Islands.

The DXCC Countries List Criteria, like the law, is open to interpretation, and our interpretation doesn't always agree with that of the DXAC. But the name of the DXing game is countries, and no one says DXers can't search for new ones. The decision to make Rotuma, Banaba Island and Conway Reef new DXCC countries were the result of research by DXers . . . like yourself.

Countries Galore Revisited

Almost three decades ago, Bill Orr W6SAI identified several choice DX spots that might qualify for new country status for DXCC. His "Countries Galore in 1961" article in the January 1960 issue of *CQ* magazine is a classic. In several cases his crystal ball gazing proved true. Two of his suggested countries have become DXCC countries: the Sovereign Military Order of Malta and Hagian Oros (better known as Mt. Athos).

Enclaves

Though many of Bill's "countries" don't qualify under the current DXCC Countries List Criteria, the potential is still there. Perhaps by following his lead we can discover a few new ones. Future changes to the DXCC Countries List Criteria, such as the recent adjustments that added Rotuma, Banaba Island and Conway Reef, may pave the way. Possibly the most fertile ground is in the area of enclaves.

An enclave is an island of land belonging to one country which is located inside another country. West Berlin and Walvis Bay are notable examples.

Study the DXCC Countries List Criteria. Point 3(a), which defines the 75-mile rule, very nicely prevents several enclaves from becoming DXCC countries. And Point 4, which defines ineligible areas, nails the lid shut on embassies, monuments, etc.

But times change and the Criteria may change; the 75-mile rule may become the 20-mile rule, or the 5-mile rule, or eliminated completely. Who knows? Let's look at several European enclaves that cannot quality for DXCC status under the current Criteria because of the 75-mile rule.

The enclave of Campione D'Italia is a part of Italy that is totally enclosed within the boundaries of Switzerland. This enclave is located just a few miles from the Italian border near Lugano, Switzerland—described as a glamorous casino which has been Italian since the 8th century.

The West German enclave of Businger, near Schaffhausen, is also located within the borders of Switzerland.

Another unique part of Europe is the enclave of Baarle-Hertog, which belongs to Belgium, but is located within the borders of Holland, just 9 miles from Turnhout, Belgium. With Baarle-Nassau it forms the town of Baarle, Holland.

The intriguing thing about Baarle-Hertog is . . . it is not just a single enclave in the normal sense, but rather more than thirty tiny enclaves, some enclosing areas of land that belong to Holland—enclaves within enclaves. No clear line divides the two communities; they are intermixed. In 1984 a group of Dutch operators operated ON8SB/A from Baarle-Hertog.

The enclave of Llivia is a part of Spain completely landlocked inside France, just a short distance from Andorra.

DXing is fun, but creating a NEW DXCC country can be fun, too!

Continued from page 38

quickly, the transistor turns on and pulls in the relay. This switches the antenna over to the transmitter.

A second set of relay contacts mutes the receiver. When the key is opened, the capacitor starts to discharge. The amount of time required to do this is dependent on the setting of R2. The more resistance, the slower the delay. Resistor R3 limits the current to the transistor switch.

Testing and Troubleshooting

Very little can go wrong. Check over your work and apply 12 volts to the relay control line. The relay should pull in. Remove the 12 volts from the control line and the relay should stay in for a second or two, depending on the setting of limits. Of course, you must have 12 volts applied to the relay coil all the time. The only trouble you might get into is a leaky junk box transistor. I pulled my hair out for an hour or two wondering why my version for the 30 meter transmitter did not release the relay. Leaky junk box 2N2222 was the culprit.

Now when you key the transmitter, you switch antennas and mute the receiver. Of course, with the receiver muted, you can't hear the signal. I added a small sidetone oscillator to the transmitter. The circuit is a bit different from what most QRP operators have seen in the past. I wanted to have a good sounding sidetone, without spending a lot of time and money. What you see here is a tried and true circuit. I added it to enhance the performance of the 30 meter transmitter.

Sidetone Generator and Fine Points

Figure 4 shows the details of the sidetone generator. Note the LM386. This is a very common low power audio amplifier chip. The sidetone is generated and fed into the chip. This may seem like overkill, but we have a very good start for the audio part of a direct conversion receiver. All we really have to do is add the mixer and a filter or two. You can press a second 2N2222 into service as a low level preamplifier. (We could get better results with a low noise transistor, but we'll hold that one for a different month.)

Due to the high gain of the LM386, keep all leads as short as practical. The 470 mF capacitor on the supply line must be as close to the amplifier as possible. Do not leave this capacitor out of the circuit.

You can increase or decrease the gain of the LM386 by changing the value of R1. To increase the gain, decrease the value of R1. But beware! Instability will raise its ugly head if you raise the gain too much.

The sidetone is generated by—guess what?—a 555 timer chip. I've used these before and have always had good luck with them. They always work. I've added some extra capacitors to make up a simple filter to roll off some of the square waves from the output of the chip. This makes for a much nicer sounding tone. As always, you can pick the capacitor values to suit your own needs and tastes. Adjust the sidetone level via the 1kΩ trimmer.

Refinements

I originally wanted to keep the sidetone oscillator running all the time and key the output to the amplifier. This worked, somewhat. Given the amount of gain in the audio chain, the signals blanked because the sidetone bled through to the audio. I decided to key the Vcc to the 555, using another PNP switching transistor. As a second thought, I added a small red LED, mounted to the panel, to the switched side of the transistor. This LED flashes code as you key the transmitter.

You can change the frequency of the sidetone by changing the 100kΩ resistor and/or the 0.01 capacitor connected to pins 2 and 6.

Again, check your wiring for errors. Build the amplifier first. Apply voltage and touch the input of the chip, pin 3, with your finger. You should hear a loud buzz from the speaker. Set the level control to about halfway. After you complete the sidetone generator, ground the key line of the tone generator; you should hear the sidetone coming from the speaker. That's about all there is to it. Connect both key lines together, sidetone and transmitter. Ground the key line, the relay will close, and the sidetone will emit from the speaker. Just like the big rigs!

Stay Tuned

A lot is going on this new year. Look for some QRP mods for ICOM radios coming next month.

When the earthquake hit San Francisco late last year, many hams were on the air even though the grid power was knocked out. Next time someone pokes fun at your QRP rig, tell'em that low power is always better than no power.

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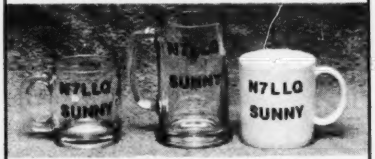

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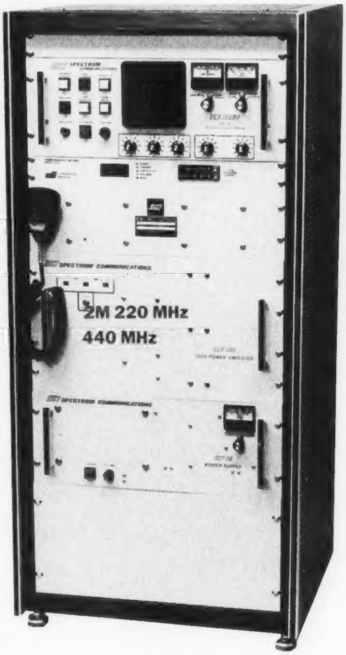

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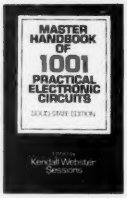

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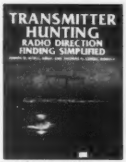

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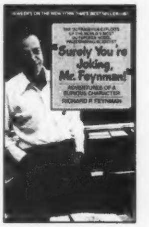

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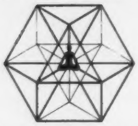

If you've read *Surely You're Joking, Mr. Feynman,* or seen the program Nova did on the late Richard Feynman, you know already how Feynman cut through the cloud of multi-syllabic scientific jargon which, as a Nobel prize-winning physicist himself, he understood only too well, to illustrate, by dipping a sample of the O-ring material in his glass of ice-water, that it just wouldn't perform at near freezing temperatures. They hated him for that.

Another top physicist, David Bohm, has some interesting things to say, in layman's terms, that come out of The New Physics. Bohm, a student of Oppenheimer and Einstein, wrote one of the best books on Einstein's Special Theory of Relativity. Science texts mention the Bohm Diffusion, the Bohm-Ahranov effect. Bohm's book *Wholeness and the Implicate Order* is an astonishing, mind-stretching view of Universe. When he demonstrated mathematically that the flux we think of as empty space contains, in one cubic centimeter, more potential energy than the energy-as-matter in our entire physical universe, I knew instantly that something that outrageous had to be true.

What the New Physics is showing is that organisms are not "built up" out of parts, but are aspects of an unbroken wholeness. One poet of the new physics put it this way: Consciousness is not an island, it is the Ocean.

When people or groups think of themselves as separate from the whole, they behave in fragmented ways. Bohm is experimenting with a process he calls Dialogue. This sounds like a pretty familiar word, what can be new about this? People get together and talk, is that all? Well, maybe it's in the way they do it. If there is no leader, no boss, no ideology, no agenda, what would happen? Would it degenerate into small talk? Come on, you are hams, you've been through this in roundtables. So isn't small talk an agenda? What if we set aside our program of small talk? What then? Profound talk? Is that an agenda? If so, set it aside and keep talking. Sports, politics? More agendas. Without agendas does dialogue degenerate into aimless rambling? Can something emerge that is independent of what is being talked about, something that is read between the lines, a common ground, a rapport, an understanding between people?

Groups in U.S. and Europe that are experimenting with Bohm's model of dialogue are finding that indeed, when attention is present, and there is no monopolizing of this attention through indulging in opinions, or propaganda, that something like a group mind, or collective consciousness emerges. I'm not quite comfortable with either of these terms, since they seem to imply a whole that is made by putting parts together. Instead, what seems to be emerging is a natural unity that was there all the time, a consciousness or intelligence that is inherent in the way things are.

What does this bode for ham radio? I heard again last night from a well-informed source that ham radio is dying. What a shame. We have an incredible medium of communication. We shine in emergencies. Isn't there a worldwide emergency caused by a lack of experiencing this fundamental wholeness, this oneness of all life? Can amateur radio address that emergency? How?

Think Tanks

Think tanks seem to work very well in groups of five. Think of a basketball team, with five players. Think of the hand, with five fingers. This is your basic think tank. A handful of people.

Real thinking is not just reciting something you have learned. It is learning while speaking, a revelatory process. I have seen Bucky Fuller do this in front of a large audience, coming upon a breakthrough realization while talking. He intentionally spoke without prepared notes, instead taking his cues from what was "in the air," from sensing what the audience was ready to think about.

Isn't this what's fun in friendly conversation, that it's not just old stuff, but something new is happening? You're using old words and drawing on old information, but something else is present, too. Call it live awareness or whatever you like. It's fresh. If it isn't there, talking is deadly dull.

What Bohm is saying is that dialogue is a living process that is integrative, revelatory, refreshing, inspiring, energizing; that it reveals a harmony that is fundamental and universal.

So hams are supposed to organize think tanks on the air to solve the problems of the world? In a word, yes. Because no one else is going to do it. Not the experts, not your elected representatives nor your chosen deities. Only participation works. Delegation won't work. It's like sex. Leaving it to someone else won't do. You've got to be there.

For more about Bohm, see Quantum Leap, *New Age Journal,* Sept. 1989. ■

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PROPAGATION

Jim Gray W1XU

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PO Box 1079
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Good DXing on the Way

You can expect February to be a fairly good month for DX, as conditions recover from the mid-winter doldrums and race toward the vernal equinox when DX is superb. Because solar flux will be very high for most of the month, all HF bands from 160 through 10 meters will give surprising results.

160, 80, and 40 meters ought to be good from sunrise to dark. Although MUFs will often be above 30 MHz, some days will tend to be worse than others, due to magnetic field upsets from excessive solar activity. These days are most likely to occur between the 12th and the 19th, and then again between the 24th and the 28th.

However, compared to recent years, conditions will be excellent on most days.

During times of flares and proton events, take advantage of 6 and 2 meters for special VHF DX and even auroral propagation. On the 9th there will be a full moon and a total lunar eclipse in Alaska and the arctic, as well as in Africa and Australia. The rest of us can expect a partial eclipse.

As always, look to WWV at 18 minutes past every hour for solar-terrestrial conditions and propagation trends. Remember: A high solar flux and a low A index are good. ■

EASTERN UNITED STATES TO:

GMT:	00	02	04	06	08	10	12	14	16	18	20	22
ALASKA	15	—	—	—	—	20	20	15	15	—	—	15
ARGENTINA	15	15	15	20/40	20/40	—	—	—	—	—	10	10
AUSTRALIA	15	15	—	—	20	20/40	20	20	—	—	—	—
CANAL ZONE	15	20	20/40	20/40	20/40	20	20	20	15	15	10	10
ENGLAND	40	40	40/80	40/80	40/80	—	—	10	10	15	20	40
HAWAII	15	15	20	—	40	—	—	—	—	—	—	15
INDIA	15	20	—	—	20	—	—	—	—	—	—	—
JAPAN	15	—	—	—	—	20	20	15	15	—	—	15
MEXICO	15	20	20/40	20/40	20/40	20	20	20	15	15	10	10
PHILIPPINES	20*	—	—	—	—	—	15	—	—	15(1)	15(1)	—
PUERTO RICO	15	20	20/40	20/40	20/40	20	20	20	15	15	10	10
SOUTH AFRICA	—	40	—	20	20	—	—	15	15	15	—	—
U.S.S.R.	—	—	—	—	—	—	20	15	20	20	—	—
WEST COAST	15	20	40/80	40/80	40/80	40/80	80	20	10	10	10	10

CENTRAL UNITED STATES TO:

GMT:	00	02	04	06	08	10	12	14	16	18	20	22
ALASKA	15	15	—	—	—	40	20	20	20	—	—	—
ARGENTINA	10	15	20/40	20/40	—	—	—	—	—	—	15	10
AUSTRALIA	15	15	15	20	20/40	20/40	20	20	—	—	15	—
CANAL ZONE	15	20	20/40	20/40	20/40	20	20	20	15	10	10	10
ENGLAND	—	—	—	—	—	—	20	15	10	15	20	—
HAWAII	15	15	15	20	20/40	20/40	—	—	20	—	—	15
INDIA	15	20*	20	20**	—	—	—	—	—	—	—	—
JAPAN	15	15	—	—	—	40	20	20	20	—	—	—
MEXICO	15	20	20/40	20/40	20/40	20	20	20	15	10	10	10
PHILIPPINES	15	—	20**	20**	—	—	20	20	15	15	—	—
PUERTO RICO	15	20	20/40	20/40	20/40	20	20	20	15	10	10	10
SOUTH AFRICA	—	—	40	20	—	—	—	—	15	20	—	—
U.S.S.R.	—	—	—	—	—	—	—	—	—	20	20	—

WESTERN UNITED STATES TO:

GMT:	00	02	04	06	08	10	12	14	16	18	20	22
ALASKA	15	—	—	20	20	20	20/40	—	20	15	—	15
ARGENTINA	10	15	15	15	20	—	20	20	—	—	—	10
AUSTRALIA	10	10	15	15	20	20	20/40	20	20	—	—	—
CANAL ZONE	15	15	20/40	20/40	20/40	20	—	15	—	—	10	10
ENGLAND	—	—	—	—	—	—	—	—	20	15	20	—
HAWAII	10	15	15	20	20/40	20/40/80	20	20	—	—	15	10
INDIA	—	—	15	—	—	—	—	20	—	15	—	—
JAPAN	15	—	—	20	20	20	20/40	—	20	15	—	15
MEXICO	15	15	20/40	20/40	20/40	20	—	15	—	—	10	10
PHILIPPINES	—	—	—	—	20	20	20	20*	15	15	—	—
PUERTO RICO	15	15	20/40	20/40	20/40	20	—	15	—	—	10	10
SOUTH AFRICA	—	—	—	20	20	—	—	—	20	15	—	—
U.S.S.R.	—	—	—	—	—	—	—	20	20*	20	—	—
EAST COAST	15	20	40/80	40/80	40/80	40/80	80	20	10	10	10	10

FEBRUARY 1990

SUN	MON	TUE	WED	THU	FRI	SAT
				1 G	2 G	3 G
4 G	5 G	6 G-F	7 F	8 F-P	9 P-F	10 F-G
11 G	12 G	13 G-F	14 F-P	15 P	16 P	17 P
18 P	19 P-F	20 F-G	21 G	22 G	23 G-F	24 F
25 F-G	26 F-G	27 F-G	28 G			

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A=B
XIT
T-F SET
1MHz
BAND
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